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The Development of Stuttering: I. Changes in Nine Basic Features

• *Oliver Bloodstein*

This is the first of three articles concerned with the changes which take place in stuttering as it grows from a phenomenon of early childhood into a disorder of adolescence and adulthood. The development of stuttering is a dimension of the disorder which has not been methodically explored. Yet there are many theoretical issues and practical clinical problems which pertain to this process of development. Ultimately, it will be necessary to identify the characteristics of stuttering age level by age level from onset to maturity through careful and detailed research. The study on which these articles are based represents a beginning rather than a completion of such a process and, being based entirely on available case records, is not free from the usual limitations of clinical observations.

Data

The subjects were 418 stutterers; 336 boys and 82 girls, who had been examined by the author at the Brooklyn College Speech and Hearing Center from 1950 to 1956. They ranged in age from two to 16 years and represented the great bulk of the stuttering cases in this age range who had been seen at the Center during that period. The distribution of subjects by age level is shown in Table 1. They consisted of both those children who had and those who had not been admitted for speech rehabilitation. The data for this study were obtained from the report of the initial interview, written in each case by the author. This initial contact consisted of an examination of the child and an interview with the parent. Making use of the information obtained from the parent, from the child, and by direct observation, this study attempts to trace the development of stuttering through changes involving nine of its basic attributes and deals with these attributes as studied individually. Parts II and III will be concerned with the steps or phases in the development of the disorder as a whole, and with theoretical and clinical implications of the data.

Table 1 shows the frequency with which a given feature of stuttering occurred in subjects at various age levels from two to 16 years. In this table the data pertaining to repetitions, prolongations, hard contacts and associated symptoms are based wholly on the direct observations of the writer. The data on fluent intervals and avoidance of speech are based chiefly on the reports of the parents, supplemented in

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TABLE 1. Percentage of subjects exhibiting each of various features of stuttering behavior at age levels from two to 16. Numbers in parentheses indicate the number of subjects on which the percentage was based where this differs from the total number (*N*) in the age group.

	Age Level						
	2-3	*4-5*	*6-7*	*8-9*	*10-11*	*12-13*	*14-15-16*
	N=30	*N=74*	*N=79*	*N=60*	*N=79*	*N=47*	*N=49*
	%	*%*	*%*	*%*	*%*	*%*	*%*
Slow, easy repetitions	30	34	28	37	30	9	8
Easy repetition or prolongation as sole symptoms of stuttering	43	32	18	18	11	4	4
Hard contacts	40	32	44	45	53	51	53
Associated symptoms	33	39	57	58	57	64	65
Fluent periods	47	45	27	10	10	9	00
Difficult situations			27	67	71	75	72
			(15)	(27)	(56)	(40)	(39)
Difficult words or sounds				82	62	72	73
				(17)	(45)	(32)	(33)
Anticipation				38	45	62	71
				(26)	(51)	(37)	(41)
Word substitution				48	65	66	83
				(23)	(48)	(32)	(36)
Avoidance of speech	00	5	11	17	28	40	45

the case of the older age levels by the comments of the children themselves. The information concerning anticipation, word substitution, and difficult words, sounds and situations was obtained by questioning the children.

The figures in Table 1 must be interpreted cautiously. In some instances it is evident that the number of subjects for whom a given type of information was available was distinctly smaller than the total *N* for the age level. Some of the data in this table may therefore be subject to considerable error in indicating the frequency of these features of stuttering for the group as a whole, as well as for stutterers as a population. Furthermore, it should be kept in mind that the presence or absence of a given feature of behavior had to be judged in some instances entirely from the child's own report and in the case of other attributes entirely from observation of the child during a single clinical interview. By and large, the data in Table 1 should be studied for their *relative* rather than their *absolute* meaning. As a further general observation about Table 1, it may be noted that it ignores the age at onset of stuttering and depicts the process of development as related solely to chronological age.

DISCUSSION

Repetition. At every age level studied repetitions were observed. Until the age of six or seven years, they are a dominating feature of stuttering, and they are most often reported by parents as the earliest noticed symptom of the disorder. In this early period, the repetitions tend to have certain characteristics which are not typical of those of older stutterers: (1) They are usually fairly deliberate and effortless by comparison with more advanced symptoms, although there are many exceptions, and the difference is wholly one of degree. (2) There is frequent repetition of monosyllabic words, in ad-

dition to the usual reiteration of syllables to which repetition will be almost entirely confined later. The words repeated almost always occur at the beginning of a phrase or sentence. In surprising contrast to the words stuttered on by older children, they are often pronouns or the small connective or relational parts of speech—articles, prepositions or conjunctions. *He, I, but, and, in, so* and similar words typically figure in these whole-word repetitions. Another type of repetition which is not often observed in older stutterers is the interjection of 'uh-uh-uh' at the beginning of a sentence.

In view of Johnson's observations on normal nonfluency in young children (*4, 5*), any description of simple repetitions as 'stuttering' is open to some suspicion and must always be made cautiously. The word and syllable repetitions described above are referred to as stuttering for several reasons. (1) They were in most cases both far more frequent and far more prolonged than the repetitions usually observed in the speech of young children. (2) In many cases, including some of the mildest who were brought for examination, the parents' and the author's evaluation of the repetitions as abnormal was apparently shared by relatives, friends, or neighbors who had referred to them as 'stuttering.' (3) Even in cases in which it might have been possible, by a somewhat liberal interpretation of speech adequacy, to regard the repetitions as not wholly or essentially different from those of normal children, there was often a past history of unquestionable stuttering which served to destroy the illusion of a completely typical child with normal nonfluency. That is, the parent often reported that there were occasions when the child 'pushed his words out,' shut his eyes tightly, etc., or that the child had passed through an earlier period of more or less severe, complicated struggle behavior. A final reason for regarding these repetitions as stutterings, and perhaps the most compelling reason of all, is that they showed the consistency effect, about which more will be said shortly.

After this early period repetition ceases to be the most conspicuous symptom of stuttering, except in relatively mild cases. Repetition, of course, continues to be observed as a form of stuttering at all ages, though it becomes distinctly more rare after age 11. More and more after the age of seven, and sometimes much earlier, repetitions are observed in conjunction with strenuous and complex blockages and prolongations. They undergo various other changes as well. As Froeschels (*2*) has observed, they tend to become more hurried and in some cases may begin to occur in rapid bursts as early as age three or four. Word repetitions gradually disappear only to recur sporadically in the form of postponement devices. The syllable repetitions which remain tend to become largely confined to the major parts of speech, an observation which is consistent with the laboratory findings of Brown (*1*) about advanced stuttering in general. In addition, the repetitions become limited less strictly to the first word of the phrase or sentence, although, as Brown's studies have shown, even in adulthood stuttering is especially likely to occur at the beginning of sentences.

Hard Contact and Prolongation. The so-called 'tonic' element of stuttering is to be observed at every age from

two to 16, and is, by and large, its most typical feature. Basically, it consists of a tense or forceful attack on a word or sound. From this point of view there appears to be no sharp distinction between hard contacts and prolongations. Prolongation may be thought of as an aspect of hard contact which is most prominent on continuant sounds. Any strenuous attack on a sound appears to result in a slight prolongation, however, and most stuttering blocks of this type do not fit neatly into two such categories. They are, perhaps, regarded more accurately as ranging on a continuum of pressure symptoms which vary from very brief to quite prolonged in duration.

As Table 1 shows, the percentage of children who exhibited hard contacts during the clinical interview did not vary greatly with age level. It is true that the percentage rises slightly and that there are many children who do not appear to force severely at all during the early years. But on the whole the outstanding fact about the tonic symptoms of stuttering is that they appear with a considerable degree of effort and strain in so many of the youngest children. Of the nine two-year-old subjects in the group, four exhibited definite forcings together with simple repetitions, one exhibited forcing as his only symptom during the interview, and one had forced previously according to the mother. These cases are perhaps not typical of two-year-old stutterers. That is, it is reasonable to assume that a child as young as two is less likely to be taken to a speech clinic unless his symptoms are especially severe. They demonstrate, however, what is possible, and what one may expect to find in a clinical setting. Among the 56 three- to four-year-old subjects, 22 exhibited some forcing in the interview, five more were said to have forced at some time in the past, and one was reported to have forcings which were not observed in the clinic.

Not only are pressure symptoms often evident very early, but in some cases they are apparently the first symptoms identified as stuttering. Among 34 records of two- to four-year-old subjects which contained seemingly unequivocal descriptions by the parents of the symptoms at onset, there were eight instances in which this was true. In a few cases the events described were very recent. The records contain such items as 'Onset a few weeks ago. Forcing from the start. Mother is certain of that,' or 'Child taken for injection a month ago. Was very frightened. The next day he began to stutter with forcing, eye-blink, fist-clenching.'

Associated or 'Secondary' Symptoms. Table 1 shows the percentage of children exhibiting any of the various concomitant tensions and mannerisms of stuttering at each age level. The percentage rises steadily from 33 at the youngest to 65 at the oldest level studied. These minimal figures represent what was possible to observe during a single interview and consequently are concerned largely with those concomitants which were firmly established as a stable feature of the stuttering pattern. Some of the subjects who did not appear to show any of these symptoms undoubtedly did so at moments of special difficulty or during severe periods. Nevertheless, it is probably quite safe to infer from the figures that at every age level there were many subjects,

particularly among the milder cases, whose stuttering had few or no overt secondary characteristics. This appears to be true even among adult cases.

Perhaps the outstanding finding, however, was the large number of children with associated symptoms at the earliest age levels. Among the symptoms noted in some cases at age two and three were eye blinking, head jerking, violent gasping, clenching of the fists, exaggerated pausing, and 'doubling up' of the body. The great majority of the secondary symptoms commonly seen in adults were to be observed in these subjects by age five. Associated tensions of the respiratory muscles are the earliest concomitants to develop, appearing in 13 per cent of the two- to three-year-old subjects. By age six to seven the percentage of cases showing such symptoms has risen to 37, after which there is no further increase. By far the most frequent breathing abnormality at every age is the habit of terminating a stuttering block with a sudden, sharp exhalation that results in the remainder of the word or phrase being spoken on residual air. This single mannerism perhaps occurs more often than most other associated symptoms put together. A second category of associated behavior, almost as common as respiratory symptoms, is facial tension, which reaches a maximum incidence of 33 per cent of subjects at the eight- to nine-year level. By far the most frequent facial symptoms are eye closure and frowning. Less common are rolling of the eyes, dilation of the eyes, opening of the mouth, protrusion of the tongue, twisting of the mouth, and flaring of the nostrils. Head movement, a third type of associated tension, reaches an incidence of about 13 per cent of subjects at age eight to nine. A fourth classification, movements of the extremities, is to be found only in very small percentages of subjects at every age. Examples are clenching the fists, hiding or striking the mouth with the hand, grasping the chin, and kicking out with the foot. Fifth are tensions of the torso which occur only in isolated cases, though at some of the earliest age levels studied, and consist of such behavior as bending, jerking, or rigidity of the body. Finally, there are vocal concomitants of stuttering, the interjection of extraneous sounds, words, or phrases. First observable in the Brooklyn group at age four, these are noticed in five to 10 per cent of the subjects at each age level except for a temporary rise to 26 per cent at age 12 to 13 which is difficult to account for except as a chance variation.

Because associated symptoms may first appear at practically any stage in the stutterer's history they may be found in conjunction with any other feature of stuttering behavior. For example, they are sometimes observed in combination with relatively simple repetitions. Even more surprising is the finding that virtually any degree of emotional reaction to stuttering, or lack of it, may accompany such symptoms. Any number of children may be seen who exhibit conspicuous secondary mannerisms despite the fact that they show little tendency to conceal their stuttering and appear to be essentially free from embarrassment about it. A typical example was a boy of eleven whose symptoms included dilation of the eyes, frowning, repetition of 'oh' before certain words, and speaking on residual air. In spite of his fairly severe stuttering, he spoke freely in all situ-

ations and resented the fact that his teacher did not call on him to recite in class. This type of observation is especially striking in young children who sometimes show little evidence of any awareness of their stuttering. For example, one boy of six years exhibited silent intervals and gasping or rapid expulsion of breath before speech attempts. In the opinion of both the mother and a speech therapist who worked with the child for a time he was not conscious of his speech difficulty. As will be seen shortly, there is evidence that this lack of awareness in young stutterers is not as absolute as it sometimes appears to be. Still, there can be little doubt that such children experience no fear of stuttering in the ordinary sense.

One further question about the development of associated characteristics requires some comment. These symptoms may be classified on the basis of the manner in which they are used to conceal or minimize stuttering, the great majority of them being starters, postponements, or release devices (*10*). In what order do these three categories of symptoms develop? It is possible to give a fairly definite answer to this question. Symptoms of release are the earliest to appear. Not only are release devices fairly common at the lowest age levels, but they far outnumber the other types at every level, occurring even in relatively mild cases and often representing the only associated symptoms in the stuttering pattern. Virtually all of the tensions of the face, body, extremities and respiratory muscles mentioned earlier are first adopted by the stutterer in order to release himself from the block. This is the usual function of the rapid expulsion of breath which is so common a feature of stuttering. After release devices, the next characteristics to appear in most cases are probably symptoms of starting. These appeared in one subject at age three and in five cases at age four. The three-year-old gasped violently both as a starter and release device. At age four, two subjects were observed to gasp or breathe deeply before attempting certain words, two more of them protruded the tongue in anticipation of speech, and the fifth used the sound [k] as a starter. Postponements follow closely on starters for the subjects as a group, and undoubtedly precede them in developmental order in many cases. Postponements begin to be noticeable at age five when a few subjects repeat such words as 'because,' 'well,' or 'well now' as a preamble to speech, or pretend to think before saying a difficult word. Before this age, in isolated cases, there are silent intervals and repetitions of 'uh' which may be postponements in the usual sense, but as will be seen later, it is difficult to be sure that these are not more appropriately considered a form of integral symptom of stuttering when they occur in very young children. One conclusion emerges fairly clearly from the foregoing evidence. Exactly as might be expected, the first devices to develop are those which arise in response to the feeling of being blocked; those which represent reactions to the anticipation of stuttering come afterward.

Fluent Periods. Stuttering in its advanced forms is a chronic disorder. The evidence gathered in this study, however, strongly suggests that the tendency to be chronic develops some time after onset in the majority of cases. One

of the outstanding characteristics of early stuttering appears to be its intermittency. Table 1 indicates that intervals of normal speech were reported by parents in 47 per cent of the two- to three-year-olds and 45 per cent of the four- to five-year-olds. These percentages should probably be very much higher. They omit some cases who were probably fluent at intervals but for whom information on this item was lacking, and they also ignore a number of subjects who had been stuttering for only a short time and probably were yet to experience fluent periods. Such periods may last for days, weeks, months, or years, and vary greatly in the frequency with which they occur. They are especially common in children from two to six years of age. After age six there is a rapid decline in the number of subjects having complete remissions of stuttering until age 14 when, as Table 1 shows, such remissions appear to cease altogether in this group. Periods of essentially normal speech may, of course, occur even in adulthood, but the marked ups and downs which many older stutterers experience usually appear to be merely fluctuations in the severity of stuttering.

The exceedingly long periods of fluency which so many children have in the first few years of stuttering are of special interest. They mark stuttering in its early phase as a disorder which tends to appear in the form of more or less discrete episodes. A few examples will serve to make this clear.

L. A. exhibited only phrase repetitions when he was interviewed at age 5-7. His first stuttering symptoms, consisting of rapid sound repetitions, were said to have appeared at age three for only about a week or two. At age five stuttering recurred in the form of sound repetition accompanied by severe eye blinking. It became progressively more severe for several months but had become much milder again by the time the child was examined.

L. B., age 4-6, began to stutter at two-and-a-half years of age with 'easy interruptions' which disappeared after six to eight months. After that stuttering 'came and went' until several months before the interview when it became more chronic with severe forcing and 'contortions.'

A. F. stuttered, blocking and repeating, at age three for two or three months, and then again at age four-and-a-half for a week. When seen at age six he had been stuttering again, so badly that his teacher at school found it difficult to understand him, but there was no stuttering when he came for the interview.

M. D. is said to have stuttered for a week or two at age three, the symptoms consisting chiefly of simple repetitions. No further difficulty was noticed until shortly before the interview, at age seven, when he began to strain and force.

These illustrations call attention to an interesting aspect of the beginning phase of stuttering in many cases. The onset of the disorder as reported by the parent is often followed after a few weeks or months by a long interval of normal speech. Many months or several years later it recurs, either in relatively chronic form or with further intermittency. The distinguishing feature of this type of early development of stuttering is that there is an introductory episode—a brief prelude, as it were, of the real disorder to come. The initial stuttering as the parent describes it usually appears to consist of simple repetitions, but forcings and even more complex symptoms are often described as well in these cases. In part, the importance of these observations lies in their relationship to the phenomenon of spontaneous recovery from stuttering which appears to occur so frequently before the age of eight or nine. It appears reasonable to assume that much

of this recovery takes place in children whose stuttering is still markedly episodic in character when episodes simply fail to recur. It may also be inferred that a great many cases of temporary stuttering in early childhood represent nothing essentially different from the initial episodes just discussed except that for some reason there was never any reappearance of the disorder. A case of this sort comes to light now and then when the parent of a stuttering child reports that the child's older sister, perhaps, stuttered at age three for a few weeks but had no further difficulty with her speech, or when a child with an articulatory defect is said to have stuttered at one time. It is sometimes possible to see the child both during and after such a single eruption of episodic stuttering. For example, one boy was examined because of stuttering at age 3-3. He repeated words and syllables, grasped his chin, used a sing song type of speech, and sometimes asked his mother to speak for him. When he was examined again at age 6-7 because of a lisp, the stuttering had long since disappeared. Some research findings (*3*) suggest that transient stuttering may be extremely common in early childhood. It is a tenable hypothesis that the troublesome, chronic cases of stuttering go back to only part of a vast number of cases of early stuttering episodes most of which occur only once and are soon forgotten.

Why do episodes recur or persist, as they did in the subjects of this study? This is almost tantamount to the question of what causes stuttering as a clinical disorder. Although it would go considerably beyond the scope of this study to attempt to answer it, it is of interest to review the reasons offered by parents for recurrences of stuttering. For the most part, these recurrences are somewhat gradual, and their cause is usually obscure to the parents. In a number of cases the speech difficulty was said to have reappeared after a tonsillectomy, when the bottle was taken away, when a baby sister was born, after a recitation experience at a summer camp, on entering kindergarten, when the family moved to a new apartment, a week before the mother was to leave on a trip to California, or when the father left for military duty in Korea. Two parents believed that recurrences were set off by any anxiety, emotional upset, or pressure on speech. In one case the periods of stuttering were linked to periods of severe constipation. In most instances, however, the episodes did not appear to have been preceded by any memorable events or experiences of this kind, and the parents were unable to suggest any reason for the recurrence.

Anticipation and Consistency. In Table 1 there are no figures for anticipation below the eight to nine year level. This is not necessarily because this feature of stuttering was absent prior to age eight. Generally speaking, the most obvious way to determine whether a child anticipates his blocks is to ask him. Very few of the younger children in the group were questioned directly about their stuttering, however, most of the information in the case history coming from the parent in these cases. The finding that as many as 38 per cent of the eight- and nine-year-olds reported some anticipations suggests very strongly that there were many children below this age who would have answered 'yes' to the ques-

tion, 'Can you sometimes tell that you're going to stutter on a word before you say it?' Above this age level, as Table 1 shows, the percentage of subjects who anticipate some of their blocks increases steadily until it reaches 71 in the oldest group.

Another of the implications of these findings is that at every age level there is a substantial number of subjects who would at first sight appear to have *no* expectations of stuttering. These are findings about which a great deal needs to be said. A very large part of modern thinking about stuttering assumes that, whatever factors of biology or personality make-up are involved in the onset of the disorder, stuttering is essentially a reaction of struggle or avoidance performed in response to the anticipation of speech interruption—if not at its inception then at least in a so-called 'secondary' stage of its development. There are, in fact, few features of the typical stutterer's difficulty more impressive than his tendency to stutter when, and evidently because, he expects to. But how, then, is it possible to explain the observation that there are some stutterers, even in adulthood, who seem to experience no anticipation at all? There appears to be a perfectly good answer to this question. In 1937 Johnson and Knott (*6*) reported the observation of what they termed a 'consistency effect' in stuttering—a tendency for stutterings to occur on the same words in successive readings of the same passage. The great significance of the consistency effect is that it demonstrates stuttering to be, in part, a response to certain features of the speech sequence. From this point of view, the presence of consistency in stuttering implies the presence of anticipation, in the sense that the blocks are evidently precipitated by certain evaluations or preconceptions which the stutterer entertains about these points in the speech sequence. That is, the stutterer responds *in advance* to the sound, word, place in the sentence, or whatever aspect of the context serves as a cue to stuttering. An unusually interesting fact about the consistency effect is that it seems to be characteristic to some degree of almost all stutterers, including those who to all appearances do not anticipate any of their stutterings. Time and again, children who asserted that they could never tell in advance whether they would stutter on a word, and who hardly seemed to understand what the 'speech doctor' was asking about, prove 'speech doctor' was asking about, proved to have difficulty with almost exactly the same words on the second reading of a brief passage as they had had on the first. The few subjects who seemed to show no consistency at all were chiefly children who stuttered so mildly during the interview that it was difficult to be sure of the occurrence of their brief and occasional blocks.[1] What

[1]While the observation of consistency in a given case would seem to indicate the presence of some form of anticipation, the lack of consistency cannot be said to prove its absence. Although they do not usually do so, the loci of expectancy can be assumed to be capable of shifting about rapidly in response to subtle changes in the stutterer or his surroundings, and it is reasonable to suppose that for the same reason that the typical stutterer fails to show perfect consistency an occasional stutterer may show no consistency effect at all.

It should be kept in mind that the consistency effect observed in this study was based on the first and second readings of a passage. When consistency is computed on the basis of the first and fifth readings, the usual practice in past laboratory studies of the phenomenon, there are probably somewhat more stutterers who fail to exhibit it.

can it possibly mean when a child whose stuttering shows the consistency effect states that he does not anticipate his blocks? Only one conclusion seems possible. Apparently, there is a meaningful sense of the word 'anticipation' in which the process referred to goes on in some manner on a subliminal level of awareness. Anticipation is simply not always highly conscious, a fact which Johnson and his students (7, *8*) pointed out on the basis of experimental evidence in 1937. The exceedingly important inference can be drawn that as early in their development as children can read a passage repeatedly, at the age of eight and even a bit younger in some cases, stuttering can be demonstrated to be an anticipatory type of reaction. The question which immediately suggests itself is whether the consistency effect is exhibited in some form by stutterers below the age of seven or eight. Such children, of course, are unable to read. It is a simple matter, however, to ask the child to repeat a series of short sentences from dictation and, having marked the stuttered words, to have him repeat the same sentences from dictation again. This experiment was tried time after time during clinical interviews with children of preschool age. The result was practically always the same. There was a degree of consistency to match that of any older child or adult stutterer.

Is it possible that the consistency effect appears even in the symptoms of the so-called 'primary' stutterer, the very young child who is said to have nothing but simple, though excessive, repetitions and prolongations and who allegedly is unaware of the interruptions in his speech? Such a finding would be in direct conflict with the most basic implications of the concept of primary and secondary stuttering. Secondary stuttering is regarded as an anticipatory reaction of struggle or avoidance which has arisen through anxiety about primary stuttering. Primary stuttering, then, is *not* an anticipatory struggle reaction, according to this concept, but a fundamentally different type of behavior which should give no sign of occurring as a response to anticipation. It is not easy to find children in the speech clinic who unequivocally fit the description of 'primary' stutterers, even if one disregards the imponderable factor of awareness and the subjective and relative factor of 'excessiveness.' Over a two-year period, however, it was possible to test for consistency by the technique described above a total of 14 children between three and six years of age whose symptoms consisted wholly or very largely of relatively simple repetitions and prolongations and who gave no outward sign of reacting to the manner in which they were speaking. If they were not all examples of 'primary' stuttering by the strictest definition of that hypothetical disorder, they appeared to come as close to it as the speech clinician's cases ordinarily do. The results were clear and unqualified to an unusual degree. *In every case there was an unmistakable consistency in the distribution of stutterings from the first to the second repetition of sentences from dictation,* the percentages of consistency[2] varying from 50 to 100, with an average of 77.1. The following are examples of test records with the

[2]As used here, this term refers to the percentage of those words stuttered in the second repetition from dictation which had also been stuttered in the first.

sentences reproduced exactly as dictated in each case.[3] (The dictation was frequently varied slightly because of differences from case to case in memory and attention span.) The number *1* above a word indicates that it was stuttered in the first repetition from dictation; the number *2* indicates that it was stuttered in the second.

The first record is that of a boy, aged 4-1, whose stuttering consisted of rapid syllable repetitions and some prolongations. There was also from time to time the repetition of 'um' before a word attempt. He was said to have 'no awareness' of his stuttering.

I'm a big boy.
I like to eat ice cream cones.
My watch has two hands.
Give me just one of them.
We're going to buy some candy for mother.
Jack likes to feed the little puppies.
Tom has lots of fun playing ball.

The next is the record of a boy, aged 5-5. His symptoms were chiefly simple, easy syllable repetitions with some prolongation. Occasionally there was a brief expulsion of breath. According to his case history, he showed 'no evidence of awareness' of any speech difficulty.

I'm a big boy.
I like to eat ice cream cones.
My watch has two hands.
Give me just one of them.
We're going to buy some candy for mother.
Jack likes to feed the little puppies in the barn.
Tom has lots of fun playing ball with his sister.
Jane wants to build a big castle in her playhouse.

The following record was obtained from a girl, aged 6-3. Although she was one of the oldest children in the series of 14, this was one of the rare cases in which the symptomatology appeared to reveal no hint of anything at all beyond simple repetition, and sometimes prolongation, of words and syllables.

I'm a big girl.
I like to eat ice cream cones.
My watch has two hands.
Give me just one of them.
We're going to buy some candy.
Jack likes to feed the puppies.

It may be added that test results of this kind are not the only evidence of the consistency effect in the simple repetitions and prolongations of young stutterers. The case records contain references to parents' reports of difficulty with specific sounds or words as early as age two-and-a-half and three. In one case it was reported that the child, aged three, spoke to her father on the telephone every afternoon. The mother said, 'Each time she asks him exactly the same questions and each time she stutters on exactly the same words.'

The meaning of these findings appears inescapable. There is apparently a kind of anticipation which underlies even the seemingly unconscious repetitions and prolongations of stuttering in its very earliest forms. This is from certain points of view a very surprising fact, particularly in relation to the theory of primary and secondary stuttering, and these implications will be

[3]Most of the sentences were taken from the Memory for Sentences items of the Revised Standford-Binet Tests of Intelligence (*9*).

dealt with in more detail in a later article. At this point it may be said that anticipation is evidently a word which can be used with more than one meaning in connection with stuttering. On one hand, there is a subliminal anticipation which is a constant and essential feature of stuttering at all levels of development. On the other hand, there is a *conscious* anticipation which develops ultimately to some degree in a very large proportion of stutterers, but which may be entirely absent even in adulthood. Conscious anticipation is the attribute whose development may be traced in Table 1. Its importance as a measure of the development of stuttering should not be ignored. Conscious anticipation is one of the most unpleasant aspects of stuttering. It is the ugly forewarning of danger by which many stutterers can predict the occurrence of so many of their blocks. It may have an affective coloring ranging from mild uneasiness to extreme agitation and panic. It leaves its traces on curves of heart rate and respiration. It was the thing referred to by one thirteen-year-old stutterer when he said, 'I know when I'm going to stutter by my mouth becoming tense just before the word I'm going to block on.' Very late in the development of the disorder in a few cases it may even become virtually the whole of the difficulty as the outward symptoms disappear and all that remains is a recurring dread of stuttering. Subliminal anticipation, by contrast, must be inferred from indirect evidence. In children who have no conscious expectation of stuttering, its existence is revealed by the effectiveness with which distractions eliminate stuttering, by the occasional presence of such anticipatory devices as starters and postponements, and, above all, by the consistency effect.

Difficult Speech Situations. One of the typical features of stuttering is its tendency to occur in large measure as a response to specific situations. This tendency does not appear to exist from the beginning, however. Since the presence or absence of situational difficulty was inferred primarily from the subject's own report in this study, the lowest age levels for this attribute are left blank in Table 1. But it may be inferred from parents' comments that during the early years, stuttering is not essentially a problem which revolves about speech situations in the same sense that it so often does later. Throughout the period beginning with age two and extending through age six the conditions which precipitate or intensify stuttering appear to be very much the same. In the first place, children at these ages are said to stutter more when excited, tense, upset, enthused, thrilled, or nervous. The word most frequently used by parents is 'excitement.' Examples given are: when he wants something badly, when he is scolded, when he is worried by thunder, when other children bother him, when he has been playing with children for a few hours, when he is arguing with his little brother, when he is reacting to something new, when he is highly motivated to do something. A second condition, but one which overlaps considerably with the first, is communicative urgency or speech pressure. Examples from parents' remarks are: when he tries to talk too fast, when he wants to get it out in a hurry, when he tells a long story, when he has a lot to say, when making explana-

tions, when trying to gain attention, when he is afraid of interruption by his sister. Still a third factor which is mentioned with some frequency is fatigue. This, however, may probably be classified under the first condition above, since children of this age are likely to become tense and excitable when fatigued. Broadly speaking, stuttering during this early period may be said to be intensified by two things, the stress of communication and communication *under* stress.

At age seven, when for the first time some children are questioned about this feature of stuttering, roughly one-fourth of them appear to stutter primarily in specific situations, and by age eight more than half the subjects questioned have at least part of their difficulty in response to such situations (Table 1). The situations which create difficulty are very much the same from age seven to 16. Mentioned over and over again are such situations as reciting in school (especially oral reading), talking to strangers, going to the store or on other errands, asking directions, and talking when there is company in the home. Situations mentioned less often are speaking to friends or to members of the immediate family. From age 11 on there are increasingly frequent reports of special difficulty on the telephone.

It must be emphasized that throughout the period covered by this study there are many stutterers who have not developed this situational consistency, especially—though by no means always—in somewhat milder cases. Such stutterers are to be observed even in adulthood. The report which they make about themselves at every age level is that they stutter only when 'nervous,' 'excited,' or 'talking fast.'

Difficult Words or Sounds. The information on this subject which is contained in Table 1 was obtained entirely by questioning the children themselves, and represents essentially the child's emerging *awareness* of certain sounds and words as difficult to say. It is extremely interesting that by the time most of these subjects were regarded by the author as old enough to be questioned systematically about their stuttering, that is by age eight, the consciousness of word and sound difficulty appeared to be fully developed in the majority of the group (Table 1). With as many as 82 per cent of the eight- to nine-year-olds displaying this feature of stuttering, it seems a safe presumption that it exists in many stutterers even earlier. How far back it may go in some cases can only be surmised. As has been seen, parents notice consistent difficulty on certain sounds or words in a few children as young as two-and-a-half years of age. The youngest child in the group who verbalized awareness of such difficulty was seven years old.

From age eight on, children's comments on their difficult words or sounds appear regularly in the case records. There appears to be a tendency for word difficulty to develop somewhat before difficulty with specific sounds in the consciousness of these subjects. Long words, words which are difficult to pronounce, and first or last names are mentioned with some regularity at all ages, but otherwise there is little consistency from case to case with regard to the types of words which are said to be difficult. From the very beginning, i.e., from age eight, there is

some mention of words which are troublesome because of their initial sounds, and after the age of about 12 such sound difficulties predominate somewhat over difficulties with specific words as such. Occasionally the most difficult sound is the first sound of the child's name. Sometimes it is a sound which the child misarticulates. In most instances, however, the case record contains no clue to suggest why some sounds came to be considered more difficult than others. The child's awareness of certain words or sounds as difficult may be quite objective and matter-of-fact, even on more advanced age levels. As stuttering progresses, however, this awareness often develops into word and sound fears, and these may in some cases become an extremely severe aspect of the problem. The mother of one 11-year-old stutterer said, 'I wanted him to buy some things. He said, "Yes. All right. I can say those letters." '

Despite the rapidity with which word and sound difficulties appear to arise in so many stutterers, there were many subjects at every age level who had not, as yet, exhibited this feature of stuttering, and there seem to be some cases in which it never develops at all.

Word Substitution. The avoidance of difficult words by circumlocutions and substitution of synonyms increases rapidly with age (Table 1), and in the oldest group it is more common than any other single feature of the disorder as defined in this study. There is hardly a more universal characteristic of stuttering in its developed form. Substitution is another item for which data do not appear in Table 1 below the age of eight because of the small number of children who were questioned about their stuttering below this age. Again, it is clear that a certain number of children must have been using some word substitutions prior to this age when as many as 48 per cent report it at age eight to nine. This is substantiated to some extent by observations made by parents. One child was noticed to substitute at age six. Occasional circumlocution was noticed by the parent in one case at age four and in another case at age three years and five months. The youngest child to report on his own word substitutions was just seven. A distinction must be made, of course, between substitutions which occur only occasionally at times of special difficulty, and substitution as a device upon which the stutterer is continually dependent. Continual or very frequent substitution is relatively rare in the group below the age of 15. Another exceedingly important distinction is between substitution in response to anticipation of stuttering and substitution in response to unsuccessful speech attempt. In the course of clinical examinations it was observed repeatedly that word substitutions were reported by children who appeared to have no conscious anticipation. Questioning revealed that in a large majority of cases the decision to substitute was apparently made, not prior to the attempt on a difficult word, but only after the child had begun to block on it. Substitution as a reaction to anticipation appears to be a relatively late development in most cases.

Word substitution is observed both with and without any of the other features of stuttering. Perhaps the most notable implication of this is that it may often be seen in children who ex-

hibit no avoidance of speech situations or other sign of emotional reaction to stuttering. Substitutions in and of themselves are no more reliable as indications of embarrassment or fear than are associated symptoms. In many children they represent merely habitual or semi-automatic reactions to speech frustration. It is only when substitutions become very frequent and occur in response to anticipation that they appear to imply the presence of strong feelings about stuttering.

Avoidance of Speaking and Other Signs of Emotional Reaction to Stuttering. In the child's reactions to stuttering lies the essence of the disorder as a handicap, and it is difficult to think of a more significant aspect of its development. In general, there are two ways in which stutterers give objective evidence of their reactions. One is through the things they say. The other is through the testimony of their nonverbal behavior, especially the avoidance of speech situations.

The earliest reactions to stuttering are immediate reactions to the experience of being blocked. Verbal and nonverbal responses of this type are reported at the earliest age levels, in some cases in conjunction with the first symptoms of stuttering noticed by the parents. Of the nine two-year-old subjects, four were said to have reacted to repetitions or other types of blockage by exclaiming, 'I can't talk,' by crying, or by looking down and blushing. In one case, seen three weeks after reported onset, the child was said to have become 'so annoyed' by his repetitions that he hit himself on the mouth and stopped talking for three days. At age three about half the children are said to have exhibited these or other evidences of reaction to stuttering blocks at one time or another. Reactions of this kind appear to be common up to about age six. At these age levels children frequently say, 'I can't talk,' 'Why can't I talk?' or 'Help me talk.' Other verbal reactions reported are 'My goodness,' 'I'm doing it again,' or 'I'll tell you later.' One child of four said, 'Mommie, I've got a lot of words—I can't say them.' The child may give up the speech attempt, cry, laugh, hit himself on the mouth, or place his hands in front of his face. One four-year-old stutterer sometimes showed his mother 'with his finger that the word wouldn't come out.' Another, aged five, sat down, cried, and struck the wall with his hands when he could not say the word.

Expressions of feeling about being stutterers or inadequate speakers, as opposed to mere reactions to blockage, are observed somewhat later, on the whole. They begin in some subjects at age four. At this age one child is reported to have said, 'Mommie, why can't I talk like other children?'—a question which is asked repeatedly at succeeding age levels. Another on the way to the speech clinic asked his mother if they would help him 'talk better' and later, as he was leaving, was overheard to say, 'Is my talking fixed now?' One four-year-old told his mother that he 'talked funny,' while another referred to what he did as 'stuttering.' From age four on, a steadily increasing number of children are reported to use the term 'stuttering' and to ask why they 'talk this way' or when they are going to 'stop doing this.' By age seven a few children are beginning to ask to be taken to a doctor because

of their speech. One seven-year-old girl asked, 'Will I stutter after I get married too?' A boy of seven said to his mother, 'I'm going to try very hard not to stutter because I don't want to hurt you.' At age eight there are such comments as, 'I can't talk like the others; they don't play with me unless I give them toys or things,' or 'Why was I born with this?' From age nine to sixteen the verbal reactions reported are substantially the ones with which clinicians are familiar through clinical experience with older stutterers. Subjects admit more frequently that they are embarrassed or concerned about their stuttering, that they rehearse speech situations mentally beforehand, that they find it difficult to talk to other people about their stuttering, and that they are hurt or angered by the reactions of some of their listeners.

Although stutterers' comments of this sort divulge much about their evaluations of themselves as defective speakers, nothing seems to reveal quite so much as the record of their avoidances. The avoidance of speaking is usually one of the last features of stuttering behavior to develop. It is probably the only feature of stuttering dealt with in this study which may be taken at face value as a sign of strong emotional reaction to stuttering. Word substitutions, severe struggle reactions, and grotesque associated mannerisms may all be observed from time to time in children who appear quite unconcerned about their stuttering, but the systematic avoidance of certain speech situations is practically never seen in such children. Furthermore, stutterers are to be found who admit a certain amount of embarrassment about their speech, feel badly handicapped, and want very much to be helped, yet do not avoid speaking—apparently under any circumstances. It is difficult to imagine what might be meant, on the other hand, by avoidance without embarrassment. According to Table 1, avoidance is first noticed in a few children at age four to five years, and increases steadily to 45 per cent at the oldest age levels. Occasional avoidances of certain types occur even earlier than age four. For example, two of the two-year-old children had stopped talking for several days as a reaction to their first experience of stuttering. One child of three sometimes asked his mother to speak for him. Another sometimes gave up the speech attempt. Still a third sometimes refused to speak to adults during severe episodes. One four-year-old occasionally drew his mother down and whispered in her ear when he wanted to speak to her. When she asked him why he did this he replied, 'I can't talk good.' All of these reactions, however, appeared to be transient and brief, and to lack the significance which is to be attached to the habitual avoidance of speech situations which is recorded in Table 1. It is not until age five that there are a few cases of fairly consistent refusal to speak in certain situations, usually at school. Children continue to avoid classroom recitation more frequently than any other situation at all ages, chiefly by refraining from volunteering to speak, or by telling the teacher that they do not know the answer or are 'unprepared.' Other common avoidances which are seen in increasing number from about age six onward are refusal to go shopping or on other errands, and avoidance of conversation with adult strangers. From about age eight many stutterers sometimes fall

silent when with friends. Beginning at about age 11 there is increasing avoidance of the telephone. A few children are said to have 'no friends' and to withdraw from social contact of almost all kinds as early as age six, but this type of extensive avoidance is rare at all ages.

The data just presented appear to have some implications of considerable significance which have to do with the question of 'awareness' of stuttering in young children. It has been seen that even at two and three years of age distinct reactions to the occurrence of blocks are evident sporadically in about half the cases. Clearly, children of this age are quite capable of knowing that there are interruptions in their speech. In the other half no outward reactions were reported. In these children one would be free to assume that awareness of stuttering is absent, and this assumption is frequently made by parents. To what extent is such an assumption valid? It is illuminating to study the children who are said by their parents to be 'unconscious' of their stuttering. Some of them are children who are reported to have expressed feelings of frustration or concern about their speech during past episodes of severe difficulty. Others are children who exhibit marked struggle reactions such as head-jerk or speaking on residual air. Above all, even those whose stuttering has never consisted of more than simple repetitions and prolongations exhibit compelling evidence of a kind of subliminal knowledge of their speech difficulty, as has been shown. It may be safe to say that no child whose repetitions show the consistency effect can be completely unaware of them in any absolute sense. In the final analysis it must be admitted that there are various degrees and kinds of awareness. It is perhaps meaningless to ask whether a stutterer whose parents consider him unconscious of his speech difficulty 'is' or 'is not' actually so. All that can be concluded is that a child who has enough awareness to stutter consistently on the same words or even to gasp or exhaust his breath before speech attempts may have sufficiently small awareness to impress his parents and even his speech clinician with the conviction that he 'does not realize' that he stutters. In precisely what sense can a two- or three-year-old child be conscious of his speech difficulty? It is a reasonable assumption that he is not able as yet to make any meaningful application of the term 'stutterer' and does not regard himself as belonging to any category of speech defective individuals. To judge from the willingness with which he speaks on almost all occasions he does not usually think of what he is doing as shameful or reprehensible. For the most part, all that such a child may be said to be aware of even in the vaguest sense is that talking is a somewhat difficult process in which he is intermittently frustrated and which often demands a good measure of his skill and concentration. Even this knowledge apparently occupies a rather low level of consciousness in the typical young stutterer, although such expressions as 'I can't talk' reveal that now and then there may be a vivid sense of failure as an immediate reaction to blockages.

In emphasizing the degree to which stutterers are capable of reacting to their speech difficulties at the earliest age levels there is some danger of creating a distorted impression. While young stutterers must probably be said

to be aware of their blocks, they are also, by and large, unconcerned about them. Even their occasional outbursts of frustration or worry should not be permitted to take on exaggerated significance. Such acute emotional reactions in young children are sporadic and tend to be associated with infrequent episodes of unusual severity. The same children on most other occasions may be so lacking in concern about their stuttering as to present the appearance of not noticing it. Even at 10, 11, and later age levels there are frequent reports that 'the child speaks freely' in all situations, that the stuttering 'doesn't bother him,' or that he does not feel he needs any help with his speech. As late as age 16, furthermore, there were still subjects, generally among the milder cases, who appeared to have little or no emotional reaction to stuttering and to whom it was, for all practical purposes, not a problem. Broadly speaking, stutterers' attitudes toward their speech disorder can be appropriately described in terms of four different degrees of reaction. The first is a vague awareness of difficulty in speaking; the individual may occasionally react to blocks with feelings of frustration, but not to himself as a stutterer. The second is an objective awareness of stuttering; the individual regards himself as a defective speaker but has essentially no affective reactions. The third is best characterized by such terms as annoyance, anger, and frustration; still basically lacking in overt signs of anxiety, the individual nevertheless regards his stuttering as an obstacle in some way to be surmounted. The fourth is fear and embarrassment, usually accompanied by some avoidance of speech situations. Stutterers situate themselves at various points along this scale at various times, progressing as their stuttering develops, falling back and progressing again. Some cases have run the whole gamut by the time they are five. Others will probably never do so as long as they live.

Summary

This article was concerned with the development of a number of outstanding features of stuttering behavior. From the clinical case records of 418 stutterers ranging in age from two to 16 data were extracted on repetitions, hard contacts, associated symptoms, fluent periods, difficult situations, difficult words and sounds, anticipation, word substitution, avoidance of speech, and other aspects of the problem. The essential findings were summarized in a tabulation of the percentage of cases who appeared to exhibit each of these features of stuttering at various age levels. Additional significant findings may be listed as follows:

1. Although relatively simple repetition is a dominating symptom of early stuttering in many cases, almost every type of pressure symptom or associated mannerism of stuttering has appeared in the case record of one subject or another by the time the fifth-year level is reached, and in some of the youngest cases in the group symptoms of this type are the essential feature of the disorder.

2. In some cases hard contacts or pressure symptoms are reported by parents as the earliest noticed symptoms of stuttering.

3. A conspicuous characteristic of the stutterings of the younger subjects which tends to disappear in time is the tendency to repeat whole words,

especially at the beginning of the sentence, and to have difficulty with prepositions, pronouns and conjunctions.

4. In a large number of children associated symptoms, sometimes of the most strenuous and complex type, seem to occur well *before* the appearance of strong feelings of fear or embarrassment as evidenced by avoidance of speaking.

5. The earliest associated symptoms to develop in the large majority of cases, and the most common at every age, are release devices.

6. Stuttering in its earliest forms is essentially an episodic type of disorder in the majority of cases.

7. Although conscious anticipation, word substitution and awareness of difficult words or sounds are, in general, advanced features of stuttering, there is indirect evidence that they may appear in some cases at a very early age.

8. The consistency effect appears at every age level studied. It is found in the stuttering of children who do not consciously anticipate their blocks, and extends even to the relatively simple repetitions of young children who are sometimes regarded as 'unaware' of their stuttering.

9. Word substitution, like associated symptoms, frequently develops prior to the development of chronic fear of stuttering, and may occur initially merely as a reaction to the frustration of blocking.

10. Acute emotional reactions may be seen from time to time in the youngest stutterers, although chronic fear of stuttering in the usual sense is one of the last features of the disorder to develop.

11. There appears to be evidence that essentially all children commonly referred to as stutterers possess some degree of awareness of their speech difficulty.

12. Reaction to stuttering may be said to appear in roughly four stages of development: (a) little overt reaction under most conditions and essentially no self-concept as a stutterer; occasional acute reaction to the speech interruption itself, (b) a self-concept as a stutterer with no emotional reactions under most conditions, (c) emotional reactions of annoyance, frustration, disgust or anger, (d) emotional reactions of fear and embarrassment.

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Communication Problems of the Geriatric Patient

• *Atwood Hudson*

Much has been written about the ever-increasing number of individuals 65 years of age and over. Because the 15 million aged now constitute a cultural minority group, they must be considered from the viewpoint of the economy as a whole. Any plans for the aged, including those for meeting communication needs, must be made with a thorough awareness of the major socioeconomic conditions which elderly persons face today. It is pertinent to consider a few details of what has been termed 'a migration across the boundaries of age.'

Socioeconomic Aspects

The most recent and most comprehensive data on the social and economic aspects of the question were presented in hearings before the Senate Subcommittee on Problems of the Aged and Aging (*15*), June 16-18, 1959. The following information was abstracted from the report:

1. By 1975 there will be 20 million aged persons in the U. S.
2. The present life expectancy of men at age 65 is about 13 years; of women, about 15.5 years.
3. About 70 per cent of the aged men are married; only 36 per cent of the older women are married.
4. According to the 1950 Census, three per cent of the aged live in institutions; this includes hospitals and homes for the aged. (During the discussion, the conclusion was reached that this figure will be much higher when the 1960 Census reports are available.)
5. In 1958, 40 per cent of the total number of people who entered mental institutions were 65 years of age or over.
6. Most of the aged live in urban areas, unevenly distributed nationally.
7. This population is relatively stationary. If they move, most move within their own county or state.
8. Most of the aged have low incomes. In 1958, three-fifths of all people 65 and over had less than $1000 in annual money income. Five per cent of men 65 or over had no income, 28 per cent of women had no income.
9. The average old age insurance benefit awarded to persons retiring in March 1959 was $82.00 monthly. The group with the lowest income are widows; over one-third of all aged widows receive $50.00 or less from social security.
10. Approximately 65 per cent of the aged do not have any health or hospital insurance although medical costs increased 34 per cent from 1951 to 1959.
11. Old age assistance varies widely from state to state: Connecticut has the highest, $108; Mississippi has the lowest, $29.

This summary is not inclusive, but it serves to point out the salient features. It is to plan for this population that the 1961 White House Conference on Aging has been called by President Eisenhower. It is to study the needs of this population that the Department of Health, Education and Welfare has ap-

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propriated $32,000 to support an International Research Seminar on social and psychological aspects of aging in relation to mental health to be held in San Francisco, August 1960 (*1*). It was in the hope of providing for this population that the Forand Bill (*15*) was presented to the last Congress. The American Psychological Association, American Medical Association, and American Public Welfare Association, among other organizations, have created special divisions to study their professional obligations to the aging (*34*). This is the population which the American Speech and Hearing Association must prepare to serve.

Communication Problems

Although individuals 65 years of age and over have been included in rehabilitation services of college, university, hospital, and community speech and hearing clinics, there is little in the literature which refers to this group *per se*. In addition to hearing impairment, the following speech and language problems occur among the aged: aphasia, dysarthria of central or peripheral nervous system origin, dysphonia due to serious neuropathologies, and loss of voice due to laryngectomy. There is a dearth of statistical information, however, on incidence. The Subcommittee on Aphasia (*46*), in the recent monograph of research needs, reported a total lack of information on the number, location, and age groups of aphasics. According to Ranney (*33*), the American Cancer Society has started a survey and census of laryngectomees; but no statistics will be available until next year. The present estimate is that there are between 12,000 and 15,000 *living* laryngectomees in the United States. There is a further estimate of approximately 4400 new cases of cancer of the larynx each year and this figure is said to be increasing by four per cent each year. The ratio of men to women is 10 to one. The average age of individuals who have surgical removal of the larynx is between 55 and 60 (*33*).

Despite the lack of information on incidence, there are several reports in the literature which reveal that when communication problems occur in the aged they are likely to appear in multiples. Street (*40*) investigated the incidence of hearing loss in aphasic patients over 50 years of age. Sixty-five per cent of her population had significant hearing loss in the speech frequencies. Street concluded that hearing loss may be anticipated in older patients with aphasia. Marks, Taylor and Rusk (*26*) and Mitchell (*27*) found a high percentage of elderly aphasic subjects also had dysarthria. Morley (*30*) discusses problems of articulation and voice which result from such serious neuropathologies as Parkinson's disease, multiple sclerosis, and chronic bulbar palsy. Buck and Cooper (*4*) reported a study of 65 patients with Parkinson's disease. Although 58 per cent of their subjects were under 50, the age range was 31 to 74. The general physical involvement was found to be significantly correlated with the degree of speech involvement. The patients with rigidity were found to have more severe speech problems than those with tremor. After surgery, speech evidenced no improvement.

Fortunately, more information is available concerning the incidence and types of hearing loss in the aged. Silverman (*38*) and Weiss (*45*) refer to the National Health Survey published

in 1940 which reported an increasing decrement in hearing acuity with increasing age. In the age group 76-and-over, one person in every six had an average hearing loss of 47 db, or more, for the frequencies 1024 and 2048. Noting the date of the survey, Silverman commented that with improved testing techniques more accurate information would be available. In 1958 the American Hearing Society (*43*) published a guidebook on hearing loss which included the statement that 12 million adults are estimated to have losses of hearing. There was no mention of age groups or of degree of hearing loss. A survey was made at a home for the aged in Chicago (*14*) for the purpose of determining the value of a hearing rehabilitation program for the residents of the home. Of the 181 tested, 159 persons failed to meet the standard which was set at an average loss of 40 db or more in the speech range. A similar program was conducted at the Montefiore Home in Cleveland (*17*). The average age of the 147 residents was 77 years. Thirty-two per cent of this group had normal hearing in one or both ears. Mild loss, described as no more than 30 db of hearing loss in the better ear, was reported for 35 per cent. Severe hearing loss, more than 50 db loss in the better ear, was found in 26 per cent, and five per cent of the residents could not cooperate on the testing. Of this population, 23 per cent had severe visual disabilities.

In the course of study of the sensory systems, hearing function has been rather widely explored in relation to aging. Whereas the types of speech and language problems found among the aged, at least in the light of present knowledge, appear to result from various pathologies, the loss in hearing acuity appears to be basic to the aging process. Weiss (*45*) reports on a number of studies, both from this country and from abroad, which establish that older subjects show a consistent loss in hearing acuity for the frequencies above 500. Pell (*31*) reported that older workers suffered more impairment from occupational noise than did younger people, and the higher the noise level the greater the impairment. The well-known study of Pestalozza and Shore (*32*) with 185 elderly people, ranging in age from 60 to 90, found discrimination for speech was poor even though the pure-tone thresholds showed only a mild loss. Fifty per cent of their subjects evidenced no recruitment, 30 per cent partial recruitment, and 20 per cent almost complete recruitment. These investigators suggested that 'phonemic regression' in the aged probably was central rather than peripheral in origin. As Weiss (*45*) points out, the ear analyzes time as well as frequency and, as the result of a study which he did with Birren to explore temporal discrimination in healthy males over 65, Weiss suggests there may be an impairment in that function. Kelley (*21*) found older individuals with loss in the high frequencies had slight difficulty in the perception of vowels in monosyllabic words, but they were deficient in the recognition of consonants at all levels of intensity.

Success of Training

Lefevre (*23*) presents the justification for treatment when she points out the increased importance of communication to the aged. When the patient

cannot speak intelligibly, or fails to understand, medical treatment and home management become more frustrating to all concerned. Furthermore, from the humanitarian standpoint, the physical changes concomitant with old age make the ability to hear and speak 'essential for adding life and enjoyment to later years.' Lefevre has found many patients can benefit from training at ages which once would have excluded them from rehabilitation. Based on her experience, she concluded, 'Age *per se* is not a primary determining factor.' Marks, Taylor, and Rusk (*26*), in the study previously mentioned, corroborate Lefevre's opinion when they conclude, after a four-year period of study, that services should be extended to a larger number of aphasic patients, . . . 'despite the handicaps of age, disease, and relatively long duration of symptoms.' Mitchell (*27*), speech specialist at the Geriatric Unit of the Oxford Hospitals, also writes of a four-year study. This investigation is especially significant because it was limited to older patients evidencing serious problems of aphasia and dysarthria. The tabulated results of the program of therapy revealed: (1) Four of the 55 patients had deteriorated; (2) 15 showed no improvement; (3) 13 evidenced slow improvement; (4) 16 showed substantial improvement; and (5) seven adjusted satisfactorily. Mitchell also delineated the role of the speech specialist on the geriatric rehabilitation team. The speech clinician's role is one of vital importance in the management of the multihandicapped patient in the clinical situation, in counseling the family, and in being the liaison person with all other professional personnel. Since the publication of this report, Mitchell (*28*) has had experience with 45 additional geriatric cases. As a result of her experience with 100 elderly people with serious communication problems, she questions the wisdom of thinking in terms of absolutes about both the goals and the success of training the geriatric patient. Instead of thinking in terms of failure versus success, the approach should be multivalued. Instead of saying, 'I can do nothing for this patient,' the clinician should ask, 'Is there anything I can do for this patient?' Perhaps it will not be in terms of language *per se*; perhaps it will be in the realm of family understanding; perhaps it will be in the sphere of assistance to co-workers to prevent confusion of aims in planning for rehabilitation. That is, the role of the specialist in communication may be one of direct effort in evaluation and in administration of training for improvement and support, or it may be indirect in an attempt to modify the patient's environment. The chosen approach will, of course, be based upon the needs of each individual patient.

So far as the laryngectomees are concerned, no reports could be found which gave statistics regarding the number of referred aged laryngectomees who were successful in learning to speak. Waldrop (*42*) reported approximately 90 per cent of those referred to the St. Luke's Clinic over a two-year period learned acceptable esophageal speech; the ages of this population were not stated. Heaver (*16*) and his associates published a report in 1955 which stated that the 274 laryngectomees admitted for voice training ranged in age from 15 to 85 years with a median age of 59. Of the 274 patients, 152 received instruction

from three to six months and were reported as achieving 'facility in the use of esophageal voice.' Almost half those admitted were reported to have discontinued treatment against advice. Lueders (*25*) stresses the importance of reporting the percentage of the laryngectomized who refuse to participate in rehabilitation efforts or who withdraw after a short period of instruction. In his opinion, reports limited to successful cases are misleading. Furthermore, it is vitally important to discover what psychological, medical, or other factors are responsible for the rejection of voice training by the laryngectomized. As a matter of fact, considering the communication-handicapped aged group as a whole, it would appear the laryngectomees have two advantages: sponsorship by the American Cancer Society and their own organization, the International Association of Laryngectomees. The latter organization is cooperating with ASHA (*29*) to raise the standards of qualifications for teachers of laryngectomees and to enlarge facilities for teacher training.

There is a paucity of information on the results of treatment for older patients with dysarthria. Morley (*30*) comments that in dysarthria resulting from such neuropathologies as Parkinson's disease and multiple sclerosis, 'a prognosis for stablization or recovery of speech function must be extremely limited.' He states, however, that often control of rate and phrasing may be improved. Furthermore, the clinician may reassure the patient who is reluctant to speak because his speech is 'too different' by pointing out that he is still able to communicate successfully and thus encourage him to continue to speak. Hoberman (*18*) describes techniques for use with voice and articulation problems in persons with Parkinson's syndrome. The implication of the report was that she was successful, at least in some cases, in eliciting increased loudness, improved resonance, and reduction of the characteristic 'slurring.'

Grossman's (*14*) report of the results of the hearing survey at a home for the aged states that the examining otologist removed impacted cerumen from the ears of 36 of the 181 persons examined. In this population, six were wearing hearing aids at the time. Although 27 additional persons could have used hearing aids to advantage, only 13 availed themselves of the opportunity for a trial period of wearing an aid. Only eight of the 13 continued to wear the aids provided. Grossman concluded the aged must be prepared both emotionally and physically for the acceptance and use of hearing aids. Subsequently, a program of auditory training was provided for residents of the home for whom aids were recommended. The program was considered successful for those individuals who were willing to accept the services provided, because of their improved personal adjustment and because staff frustration was reduced by ease of communication. Heffler and Rosenthal (*17*) reported the Montefiore Home program included speech reading and training in the use of hearing aids. Visual disabilities and lack of motivation were reported as complicating factors in rehabilitation. Prior to the initiation of this hearing conservation program, less than 10 individuals had had any experience with hearing aids although 38 could have used them to advantage. This finding agrees with Grossman's report and serves to stress the import-

ance of multi-disciplinary planning for the aged.

Rehabilitation

Gone are the days of passive acceptance of the disabilities of old age. Gone are the attitudes that the slowing step, the dimming eye, the uncertain ear, and the inadequate speech, mark the point of no return. Instead there has developed a dynamic approach to the problems of aging through a multidisciplinary program of restoration. Rusk (*36*) has been one of the pioneers in urging physicians to remove hemiplegics from their beds and provide services to teach them ambulation and self-help. Rusk also is aware of the necessity for language training for the aphasic patients (*26*, *36*). Even with mental patients a new approach is evident. Ferguson (*11*) writes of elderly patients crowding the mental institutions. For years, at a state hospital, means were sought to help elderly patients regain their rightful status as individuals. No cure has been found; but Ferguson reports that through knowledge gained from medical research, '. . . many of the manifestations of senility can be controlled, ameliorated, and reversed.'

A recent book by Redkey (*35*) reports the growth of rehabilitation centers since 1946. They vary widely in type and sponsorship. The federal legislation in 1954 served to spur the establishment of new programs and to extend existing facilities. Both the Office of Vocational Rehabilitation and the Public Health Service make funds available for comprehensive facilities. . . . Switzer (*41*) Director of the Office of Vocational Rehabilitation explains that the term 'comprehensive' refers to the scope of service and not to the variety of groups served. The result of increased federal aid has led to the establishment of 18 centers in 14 states located in medical schools and teaching hospitals, 10 centers in general hospitals, 12 centers in specialized hospitals; and there are 22 independent community programs. In those centers reporting medical personnel, 67 per cent employ speech clinicians and 47 per cent offer audiological services (*35*).

There appear to be only a few programs which exclusively serve geriatric patients; two of these are the Geriatric Clinic in Beth Israel Hospital (*12*) in New York and the Geriatric Unit of the Oxford United Hospitals (27) in England. Asked about the attitude of the national Office of Vocational Rehabilitation toward special services for the aged Switzer (*41*) replied:

> In general, I think our philosophy would be that the needs of the aged can best be met in centers that serve all age groups. The reason for this is that comprehensive rehabilitation centers are quite expensive to organize, operate and staff, and there are staff shortages in every discipline involved. . . Our philosophy with regard to rehabilitation services for the aged who may not be able to work is that rehabilitation services leading to self-care and restoration of as much function as possible is highly desirable. Under the present Vocational Rehabilitation Act, however, our program is limited to those persons for whom an employment objective can be established. There is pending in the Congress some legislation which, if enacted, would broaden our authority in this respect.

The elderly individual with loss of hearing and language or articulation problems, often suffering from hemiplegia or disabilities of other neuropathological etiology, requires such treatment as can best be provided by

the comprehensive centers. Members of ASHA should seize the opportunity to support the organization of such centers in communities which are large enough to provide for them. Even in smaller communities the assistance may be enlisted of the medical society, nurses' groups, welfare agencies, service clubs, and religious organizations to make known the possibilities for rehabilitation of the aged. There is a need for special centers, certainly, but much can be done in 'grass root' areas.

Research

The scope and types of research on problems of aging are impressive. Shock's *Classified Bibliography* (*37*), Supplement One, which is limited to the years 1949-1955, has over 15,000 titles. Such well-known books as *Geriatric Medicine* (*39*), *The New Frontiers of Aging* (*10*) and *The Care of the Geriatric Patient* (*8*) have chapters written by different specialists in the medical, surgical, psychological, biophysical and sociological fields. Similar in organization is a new publication, *Handbook of Aging and the Individual, Psychological and Biological Aspects* (*3*). From these and other sources certain reports have been selected as especially challenging and meaningful to the field of speech pathology and audiology. It is also hoped that those interested will explore this literature since the scope of this paper will allow only implications of several hundred studies, each interesting and pertinent to the general study of aging.

Most of the leaders in the fields of social and biophysical research consider the field of gerontology to be in its infancy, but certain concepts and principles are emerging. From the viewpoint of the neurophysiologist, Gerard (*13*) writes,

> None but the fatuous romantic denies that man's abilities and performance decay with advancing years, yet it has proven singularly difficult to relate this to any concrete structural or functional alteration in the nervous system and its attached organs.

Research reports considered especially significant in communication are those dealing with sensory function, perception, psychomotor ability, intelligence and social adjustment.

Birren (*2*) reports that the slowing of responses with advancing age cannot be attributed to the peripheral nervous system. He established that old nerve fibers show no reduction in rate of conduction and no rise in threshold and that there could not be demonstrated any fall in action potential or rise in refractory period. Weiss (*45*) summarizes over 100 studies on sensory function which disclose a general reduction in the quantity and quality of information the older person receives from his environment, both internal and external. The sensory decrement which occurs with age affects different modalities at different rates allowing for some degree of compensation. The investigators have not determined the exact nature of the neural changes, but they seem to result from a reduction in the number of nerve cells. Weiss points out 'when the number of elements in a channel' is reduced a longer duration of stimulus is necessary.

Experiments to test changes in perception with age naturally overlap with those on physical changes in the sense organs. The loss of speed in perception has emerged as characteristic of responses of elderly people. Braun (*5*)

states that studies on perception indicate the age change is central rather than peripheral in localization. One perceptual problem found in older persons has been termed 'environmental exclusion.' An illustration of this behavior is the frequently heard comment, 'Grandfather has a hearing loss except when we say something we don't want him to hear.' Donahue (*9*) considers this behavior to be an indication that the older person knows he cannot handle mentally the variety of environmental stimuli; so he forms this defense mechanism, unconsciously, and devotes his psychic energy to those stimuli which are emotionally pertinent.

Welford (*44*), who has done extensive investigations in the psychomotor aspects of aging, reports on his own work and that of others. These investigators find the slowing of performance in the elderly depends upon limitations of the central mechanism during reaction time. In complex tasks, when the subject is required to relate what he perceives to what he does, the older subject's performance suffers. The general conclusion is that, probably in compensation, the elderly display a consistent tendency to shift emphasis from speed to accuracy.

Research studies also have been done to test the belief that as man approaches old age his mental faculties deteriorate. Among the faculties explored have been intelligence, memory, mental efficiency, and speed of learning. The results have indicated a decline in intellectual ability, but the decline is neither uniform nor predictable. As Kay (*20*) states it,

> . . . evidence upon the learning abilities of older subjects is not unequivocal. There is no conclusion which has not been challenged with the possible exception that the data so far are inadequate to support any general conclusion.

There is a consensus of opinion that present scales and testing techniques are inappropriate for measuring mental function in the aged (*9*, *19*, *22*, *24*). Despite the lack of appropriate instruments and the disagreement on interpretation of the findings, those abilities which seem least affected by aging are those concerned with vocabulary, reading retention, and general information (*9*). It has been pointed out that these are the abilities which are exercised daily throughout life.

Another finding which should be mentioned is that when clinical behavior has been compared with postmortem examinations of the central nervous system no correlation could be established. Donahue (*9*) states,

> . . . post-mortem examinations have revealed severe neuropathologic changes in the brains of some individuals who were making quite adequate adjustments immediately prior to their deaths. On the other hand, little or no brain change has been found in other patients who, before death, showed marked psychologic deterioration such as is present in senile dementia. . . . From observation it appears that older people are able to tolerate extensive degenerative change in the central nervous system without serious effect upon their behavior provided that their cultural environments continue to support them.

The use of the electroencephalogram also has been employed in studies of aging. Although it has proved useful in research, Busse (*6*, 7) urges caution in basing judgments on the EEG in at least two instances: (1) Some individuals who have severe brain wave disturbance consistent with organic changes can maintain satisfactory social adjustment. (2) There is a high inci-

dence of left temporal lobe dysrhythmia present in the EEG's of normal subjects over 60 which have not been correlated with presence of disease or psychological perfomance.

An additional area of extensive investigation concerns the adjustment problems of the geriatric patient. Measures of adjustment used with the aged have proved unsatisfactory because they have been developed and validated with groups of younger people. For that reason Kuhlen (*22*) considers the results clinically useful, but he thinks their research value is limited. Lewis (*24*) questions the use of interviews, inventories, and attitude questionnaires in assessing the personality of the aging. He protests that such measures may be revealing of what a particular society expects of the elderly but they can tell little about personality change. Just as there may be a disparity between a person's physiological age and chronological age, so a difference has been found between psychological age and chronological age. The authorities (*6, 9, 19, 24,*) agree that as a person grows older his personality characteristics become intensified. He becomes 'more and more like himself.' Kuhlen (*22*) summarizes the findings of the adjustment studies in *Handbook of Aging and the Individual*: (1) Older people tend to be insecure. (2) They tend to be threatened by stressful situations. (3) They tend to become dogmatic, conservative, rigid; and they evidence more avoidance behavior.

Application

The results of research in other fields may be applied in the evaluation and treatment of communication problems in the aged. The following applications are suggested: (1) The import of the delayed response and the slowness in perception implies that evaluation not only will take a longer time than customarily is provided, but techniques must be modified and testing materials devised appropriate for the aged. It suggests further that long-term training may be anticipated with its attendant problems of expense and motivation for patient and family alike. (2) The uneven decrement of sensory modalities suggests the employment of multiple sensory input both in testing and in treatment. (3) Provision should be made for the defense mechanism 'environmental exclusion' by devising emotionally pertinent techniques and materials. (4) The known intellectual strengths of vocabulary, reading retention, and information should be utilized. (*5*) There is sound neurological basis for the early institution and extended duration of programs of treatment. (*6*) Therapy may prove most important in its supportive function, that of helping the patient become and remain as socially adequate and as mentally alert as his residuum of abilities allow.

Summary

An unknown number of the 15 million individuals over 65 years of age are known to have certain types of communication problems; research is needed to determine incidence. Many of the deficits in communicative function are serious in nature and they tend to appear in multiples. Because of the multiple impairment, the rehabilitation should be multi-disciplinary. The economic requirements of total rehabilita-

tion call for every available resource, federal, state and local. Clearly there is a need for members of the American Speech and Hearing Association to join other scientists in studying the processes of aging. The philosophy of rehabilitation was aptly stated by Gerard (*13*):

> To maintain life without health is tragic; to maintain life and health at the animal level without the capacity for interpersonal human behavior is only less so.

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A Movable Bulb Appliance to Assist in Palatopharyngeal Closure

- *Samuel G. Fletcher*
- *Richard C. Haskins*
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Palatopharyngeal apposition ordinarily occurs during phonation of each vowel and voiced consonant, with the exception of the nasal consonants [m], [n] [ng]. If this approximation is not achieved, an excessive proportion of the phonatory air stream may pass through the nasal cavities which are highly damped transmission channels, and produce unusual patterns of resonance classified as hypernasal voice.[1] If the interspace between the palate and the pharyngeal wall exceeds a few millimeters, not only is hypernasal voice present, but articulatory errors become increasingly prominent because of insufficient build-up of air pressure within the oral and pharyngeal cavities (*1, 18*). In this circumstance, speech intelligibility is decreased both by the distraction resulting from hypernasal voice and by the distorted consonants. Hypernasal voice may be present from the first attempt at voluntary phonation. This voice problem may develop gradually during the early years of life. Or, hypernasal voice may have a sudden onset related to disease or trauma. The many causes for this voice quality may be classified in the following outline, based in part on classification by Calnan (*6*):

1. Anatomical deficiency and distortion
   a. Congenital: cleft palate, submucous cleft of soft and/or hard palate, hypoplasia of soft and/or hard palate, large pharynx resulting from extreme inclination of the pharyngeal wall, hypoplasia of the palatal or the pharyngeal suspensory system
   b. Acquired: trauma (surgical, chemical, thermal, penetrating wounds), destructive disease (cancer, syphilis)

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[1] Hypernasal voice, rhinolalia aperta, is often confused with denasal voice, rhinolalia clausa. In the latter condition, occlusion or congestion of the nasal cavities obstructs nasal expiration. This occlusion causes the person to substitute the plosive sounds [b], [d] and [g] for the nasal consonants [m], [n] and [ng], respectively. The speech resulting from this occlusion is exemplified in persons having unusually enlarged adenoids or have the common cold.

2. Physiological deficiency or distortion
   a. Cerebral, cortical and supranuclear
      (1) Congenital: severe mental deficiency, hypoplasia
      (2) Acquired: trauma (vascular, direct injury), destructive disease (encephalitis, meningitis), neoplasm
   b. Motor neurons and peripheral nerves
      (1) Congenital: hypoplasia
      (2) Acquired: trauma (vascular, direct injury), destructive disease (poliomyelitis, diphtheria), neoplasm
   c. Muscular:
      (1) Congenital: hypoplasia
      (2) Acquired: muscular dystrophy, myasthenia gravis, malnutrition
3. Functional disturbances
   a. Learned: unfavorable developmental patterns of speech (high, retracted tongue position, insufficient opening of mouth), unfavorable-speech example (hypernasal parent, sibling or other associate)
   b. Persistence of transient disability: after hyperalgesia following tonsillectomy and adenoidectomy; after organic effects of disease have sub-

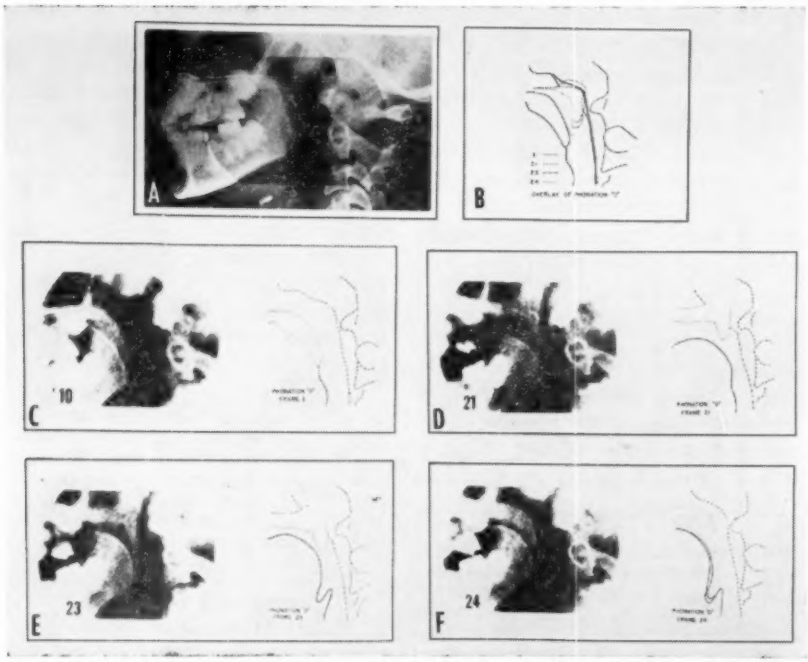

FIGURE 1. Radiographic series illustrating palatopharyngeal closure in a normal subject while phonating the vowel [o]. A. Head radiograph depicting cinefluorographic field in relation to the dimension of the oral, pharyngeal and vertebral structures. B. Overlay drawing made from the individual cinefluorographic frame tracings shown in Figures C through F. C. Photographic enlargement and tracing of a single cinefluorographic frame with the subject in rest position. Note the concave surface of the dorsal pharyngeal wall above the level of the first cer ical vertebra. D, E. Phonation of the vowel [o]. Note the ventrad position of the upper pharyngeal wall in relation to the basicranium and the first cervical vertebra. F. Structures returning to rest position.

sided (poliomyelitis, diphtheria, meningitis)

c. Psychogenic: excessive muscular tonus within the speech mechanism (similar to unfavorable developmental patterns of speech)

In view of this multiplicity of causes of hypernasal voice, a variety of diagnostic and therapeutic approaches are required to achieve optimal results in voice improvement. In this presentation, particular attention is given to a prosthetic appliance designed for subjects having developmental deficiencies of the structures participating in palatopharyngeal closure. The subjects under study had hypernasality without gross cleft of the palate. In cineradiographic study of these subjects, evidence was found that palatal or good bolus contact seemed to elicit a tactile response of the pharyngeal wall, enabling it to assist in palatopharyngeal closure during speech activities.

Anatomy and Physiology

Hypernasality is immediately controlled by the soft palate and the adjacent portions of the pharynx. Analogous to the tongue, the soft palate has both intrinsic and extrinsic musculature, is mobile in an anatomical cavity, and functions prominently in speech articulation and in deglutition. Its range of movements is limited by its attachments to the posterior margin of the hard palate, the pharyngeal walls, and the oral cavity.

In earlier studies (7, *8*) pharyngeal contribution to palatopharyngeal closure seemed to occur as the dorsal wall of the pharynx was touched, either by the soft palate or by a food bolus, thereby suggesting that the wall of the pharynx is sensitive to tactile stimulation in such a way that the cephalic portion discriminately responds following contact (Figure 1). To further substantiate this pharyngeal tactile response, a prosthetic device with a movable bulb was designed to provide tactile stimulation to the pharyngeal wall during speech activities (Figure 2).

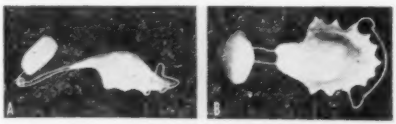

Figure 2. Lateral and superior views of the prosthetic appliance used for tactile stimulation of the pharyngeal wall during speech activities. Double springs provide reserve protection in the event of breakage from strain hardening of the metal.

Materials and Methods

Subjects. Five children, three girls and two boys, having hypernasal voice without associated cleft of the palate or cleft only of the uvula, were selected for this study. Each of these children had been evaluated by clinical methods, including radiography, and their voice problems were found to be related to anatomical deficiency or disproportion of palate and pharynx rather than to deficiency in motor power or to functional disturbances. The age range of the subjects was four and one-half through 12 and one-half years. Four of the subjects were reported by their parents to have had speech defects characterized by extreme nasality from onset of speech. The fifth subject reportedly had a normal voice until a tonsillectomy and adenoidectomy were performed when he was three and one-half years of age. Hypernasal voice

was apparent immediately following this procedure and continued to age of four and one-half years—the time of this study. Two of the subjects had received prolonged speech therapy, with little observable improvement in voice quality.

Cinefluorographic films of each subject demonstrated that the palatal musculature was functionally intact but

FIGURE 3. Instrument used to obtain lateral dimensions of the upper pharynx.

that palatopharyngeal closure was not achieved during phonation. In four of the subjects a gross bilateral patency was present in palate-pharynx approximation. In the remaining subject the left half of the soft palate was congenitally displaced caudally. During speech activities this subject achieved palatopharyngeal closure on the right side, but the patency remained on the left.

CONSTRUCTION AND EVALUATION

Study models of mandibular and maxillary impressions were used to establish dimensions and appropriate points of retention of the palatal portion of the appliance. The palatal plate was made of acrylic resin and extended from the incisors approximately to the dorsal border of the hard palate. Lateral dimensions of the palatopharyngeal isthmus were determined with an instrument such as obstetricians use for internal pelvic measurements (Figure 3). By careful insertion of the instrument beyond the pillars of the fauces, it was possible to obtain lateral measurements of the epipharynx both with the pharynx at rest and in action.

A round stainless steel orthodontic wire was found suitable as a spring for retention of the bulb in the nasopharynx. The guage of the wire varied from 22 to 26, according to individual subject requirements. The spring length was determined from a lateral radiograph of the head. The spring was made to extend from the palatal plate along the oral surface of the soft palate to the tip of the uvula, which appears on the radiograph as the distal extremity of the soft palate, thence into the upper pharynx. As a precautionary measure, two springs, one of which passed on either side of the uvula, were used. This provided a reserve spring to retain the bulb in the pharynx in the event of breakage from strain hardening of the wire. The springs could be duplicated and repositioned with little difficulty when breakage occurred. After the plate and springs were fabricated, the ends of the wires were coated with a wax bead and the appliance was placed in the mouth to determine initial adjustments. Additional wax was added later to achieve proper bulb size.

Anteroposterior measurements for the bulb portion of the appliance were obtained from lateral head radiographs, taken with the subject at rest and during phonation. The bulb was made smaller than the space between the soft palate and the dorsal pharyngeal wall when these structures were in a resting position but slightly larger than the space between the elevated soft palate and epipharyngeal wall during phona-

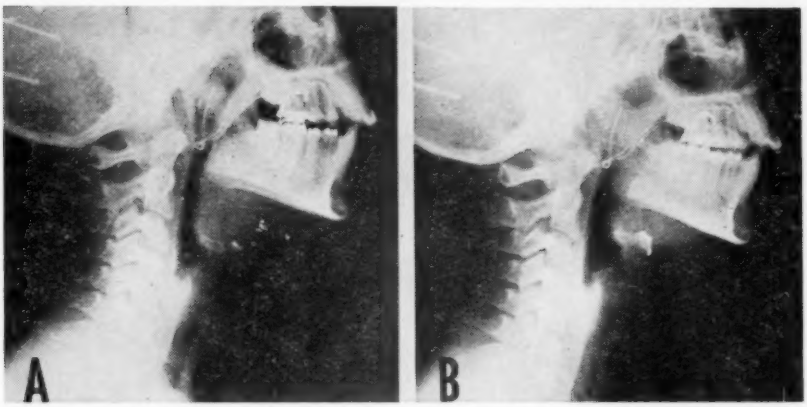

FIGURE 4. Head radiographs illustrating proper placement of the moveable bulb in relation to the palate and dorsal pharyngeal wall. Note that in the rest position (A) a free airway exists between the bulb of the appliance and the soft palate and between the bulb and the dorsal pharyngeal wall. During phonation (B) the bulb is moved into contact with the pharyngeal wall by the elevation of the soft palate.

tion. Wax was added to the lateral margins of the bulb so that during phonation it was in contact with the medially displaced walls of the upper pharynx.

Gagging was often a problem when measuring the pharynx and when fitting the bulb. This problem was diminished by instructing the subject to massage the soft palate and pharyngeal wall with the handle of a toothbrush each morning for a period of time prior to the initial attempt at placement of the bulb into the upper pharynx. This conditioning of the gag reflex facilitated placement and positioning of the bulb. The bulb was positioned between the soft palate and pharyngeal wall so that when the subject was at rest the bulb was not in contact with either structure (Figure 4).[2]

[2]If this position was not achieved, it was necessary to adjust the bulb position, since continual contact of the bulb with the palate or pharyngeal wall resulted in irritation.

The appliance was next evaluated for comfort and effectiveness in aiding the subject to achieve palatopharyngeal closure. Closure could be evaluated by the amount of fog collection on a mirror placed beneath the nares of the subject as he phonated continuant sounds, such as the sibilants [s] and [z] or the fricatives [f] and [v]. The subject was allowed a period of time to adjust his speech patterns to usage of the appliance before efficiency of the appliance as a speech aid was estimated. Significant improvement in speech was immediately apparent when the appliance was fitted properly. For example, one subject who had been unable to develop sufficient oropharyngeal pressure for the [s] and [z] was able to produce the sounds clearly when using the appliance following minimal auditory stimulation.

To evaluate the physiological response of the pharyngeal wall to touch by the prosthetic bulb, the bulb was

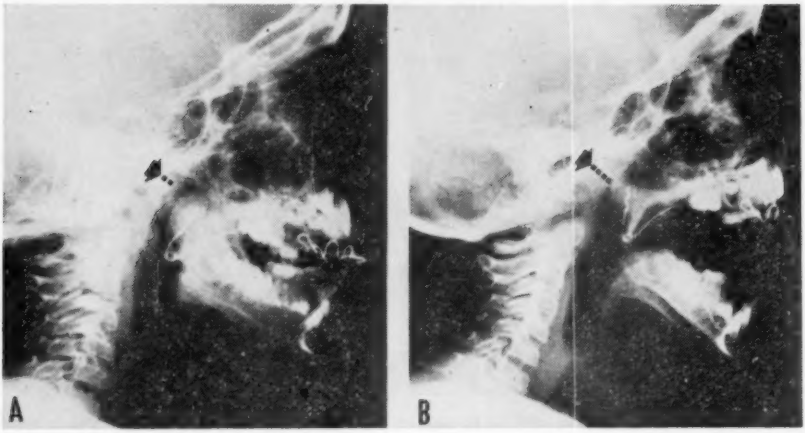

FIGURE 5. Head radiographs showing pharyngeal movement following apposition of the appliance bulb with the pharyngeal wall. A portrays the subject in rest position and B the subject during phonation of the vowel [o]. In each instance the arrow and dots indicate the relation of the dorsal pharyngeal wall to the basicranium. In B extent of pharyngeal movement is apparent. Cinefluorographic observation of this subject prior to the use of the appliance revealed no apparent ventrad movement of the pharyngeal wall in any activity other than swallowing.

so placed that palatal elevation during phonation caused it to contact the dorsal wall of the upper pharynx. After the bulb was coated with radiopaque media, it was seated and lateral head radiographs were made of each subject at rest and during phonation of [o]. Response of the pharyngeal wall was then compared with that previously identified cinefluorographically, as the same subject was phonating the vowel series [o], [a], [i] and [u]. Movement during phonation is illustrated in Figure 5.

Radiographic comparisons between the subjects at rest and phonating [o] with and without use of the appliance indicated that with the appliance in place ventrad movement of the upper pharyngeal wall occurred in three of the five subjects. Without the use of the appliance no apparent ventrad movement of the upper pharyngeal wall occurred in any activity other than swallowing.[3] In the subject with an asymmetrical palate, pharyngeal displacement was symmetrical when the appliance was used but asymmetrical when it was not.

DISCUSSION

The appliance described was devised for the individual with an intact, mobile

[3]In the earlier related studies by Fletcher (7, 8), it was observed that in three of 10 subjects with normal voice and in three of 10 subjects with hypernasal voice a small discrete ridge protruded into the upper pharynx prior to, or in the absence of, palatal contact with the wall during phonation. This ridge was seemingly independent of the accompanying general ventrad movement of the upper wall of the pharynx. It had been observed that in subjects with normal voice palatal contact with the pharyngeal wall consistently preceded bolus contact during deglutition.

soft palate who could not achieve palatopharyngeal approximation because of anatomic and physiologic limitation of the palate or of the walls of the pharynx. Although individuals with repaired cleft palate were excluded from this study, there is reason to assume that the present results might be applicable to many of these individuals.

The physiological contribution of a speech appliance for persons having a hypernasal voice was emphasized by early writers. The Kingsley (*12*, *13*) and Suersen (*19*) appliances designed for the cleft palate individual exemplify appliances based upon physiological principles. Kingsley (*12*) indicated '. . . the instrument filling the fissure in the natural palate must be of the nature of a valve, under the control of the muscles surrounding it, and so arranged that it could be elevated by them, and thus the nasal passage shut off.' His appliance, called an 'artificial velum,' consisted of soft rubber leaves in contact with the edges of the cleft palate. The central portion was thickened to provide firm contact for the tongue during articulation and deglutition. The posterior border was curved slightly caudally so that, as the palatal portion was elevated, the curved surface could approximate the pharyngeal wall and direct the air through the oral cavity. Although reportedly very successful as a speech appliance, the Kingsley artificial velum was limited by the thin, soft rubber lateral borders which tended to curl when it was used and to lose contact with the palatal halves. The soft rubber also absorbed oral secretions and became unhygienic after a relatively brief period of use. This problem led to the eventual abandonment of the appliance although the principle of the Kingsley artificial velum was felt to be sound.

Suersen (*19*) also contended, on the basis of gross inspection, that a speech appliance should be constructed on physiological principles in harmony with the natural movements of structures within the palatopharyngeal region; however, he based his appliance upon observations of pharyngeal wall contribution to speech. Suersen felt that the superior constrictor had received insufficient attention in reference to palatopharyngeal closure, and he stated: 'This muscle [superior constrictor] contracts itself, during utterance of every letter pronounced without a nasal sound, just as the levator palati does. The constrictor muscle contracts the cavum pharyngopalatinum, the pharynx wall bulging out—and it is chiefly on the action of this muscle that I base the system of my artificial palate.'[4]

As Weber (*20*) indicated, the Suersen obturator was contructed with the posterior terminal portion in near approximation to the pharyngeal wall at the level at which the '. . . superior constrictor showed its greatest constriction when the letter *a* is pronounced.' Suersen thus anticipated that ventrad displacement of the pharyngeal wall during speech would bring the

[4]The observations made by Suersen were based upon works of Merkel (*15*) and Brucke (*3*) and antedated the more complete discussion of Passavant (*16*) concerning protrusion of the pharyngeal wall during speech. Both writers ascribed protrusion of the wall to activation of the superior constrictor although Passavant described a discrete ridge, commonly called 'Passavant's ridge,' whereas Suersen termed the protrusion a 'bulging out.' These writers devised therapeutic approaches appropriate to their observations—Passavant a surgical and Suersen a prosthetic approach.

wall into contact with the fixed bulb and compel the air stream to exit through the oral cavity. The appliance described in this study combines to some extent the principles of both the Kingsley and the Suersen appliances.

Many writers have pointed out that palate-pharynx apposition during phonation is not necessary for normal voice quality. This fact led Kelly (*11*) to suggest the term 'physiological closure,' which was to include both palatopharyngeal closure and palatopharyngeal approximation. Much of the success of appliances based upon the Suersen principle may be attributed to physiologic closure since recent radiographic study (*2, 5, 10*) has indicated that the pharyngeal ridge described by Passavant, Suersen and others is present during phonation in a relatively small segment of the population and is variable in elicitation and amount of protrusion when it does occur. A movable appliance provides for greater adaptation to this intersubject variation.

A particular advantage of a movable bulb appliance such as the one described in this study is the facility with which it is tolerated within the pharynx. Lloyd, Pruzansky and Subtelny (*14*) noted that head-neck postural relationships influence the position of a fixed obturator bulb within the pharynx. They stated, 'Inadequate correction for . . . posture of the head may cause the pharyngeal section to impinge upon the posterior wall of the pharynx producing discomfort and even ulceration.' Thus, patient tolerance may be exceeded as the attempt is made to achieve physiologic closure. It was noted in the present study that springs of heavier gauge resisted palatal and pharyngeal wall movement, causing irritation.

Other suggested advantages of the movable appliance are that it enhances motions of the palate and that it facilitates motor response of the pharyngeal wall. Since palatal elevation is slightly resisted by the bulb of the speech appliance, it is suggested that the action of the levator musculature in elevating the palate may be strengthened. Strengthening of the palate musculature may in turn facilitate motor adaptation in the pharyngeal region. Motor response and adaptations of the pharyngeal wall could also be expected to supplement palatal activity. It is expected that combined adaptations of the palate and pharyngeal wall would permit gradual reduction in the size of the appliance bulb without loss of voice quality or speech intelligibility.

Cinefluorographic comparisons between adults and children with normal palatopharyngeal closure suggest that pharyngeal wall movements are considerably less in the adult.[6] An interesting speculation is that the hypernasal voice child, successfully fitted with a movable appliance which facilitates contribution of the upper pharyngeal wall, would retain a greater participation of the pharyngeal wall in speech when he is physically mature. A high degree of adaptability in the palatopharyngeal region has been suggested by Struben and van Gelder (*17*), who noted that palatopharyngeal closure in laryngectomized adults who have acquired esophageal speech is character-

[6]This is a preliminary observation from a study in progress. However, many writers (*4, 9, 21*) have indicated that adult phonatory activities are characterized by little or no pharyngeal activity.

ized by an unusually broad contact of the palate with the pharyngeal wall. The relative roles of adaptation and maturation in the pharyngeal region with and without use of prosethetic appliances are in need of longitudinal investigation.

Studies have shown that subjects having hypernasal voice tend to have associated development anomalies which extend in continuity through structures in the oral, pharyngeal, vertebral and perhaps other regions. Thus, the possibility of multiple impairments in the speech mechanism must be considered in evaluation of speech progress resulting from use of a palatal appliance.

Summary

A movable bulb prosthetic appliance was designed to assist hypernasal voice subjects in achieving palatopharyngeal closure. This appliance was used experimentally in five hypernasal voice subjects who had developmental deficiences of the palatopharyngeal structures. Significant improvement in speech was immediately apparent when the appliance was fitted properly. Radiographic comparisons between the subject at rest and phonating [o], with and without use of the appliance, indicated that with the appliance in place the ventrad movement of the upper pharyngeal wall occurred in three of the five subjects. Without use of the appliance, no apparent ventrad movement of the upper pharyngeal wall occurred in any activity other than swallowing. Three advantages are hypothesized for the use of the movable appliance.

Acknowledgments

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Quality Judgment in Hearing Aid Selection

• *Janet Jeffers*

A quality judgment test is often used by hearing aid clinics in eliciting information which will help them in guiding the hard of hearing individual in the selection of an appropriate hearing aid. Specifically, it usually consists of asking the patient to listen to a number of instruments and indicate which ones sound best to him. However, very little research has been undertaken to establish the reliability of quality judgments or the acoustic characteristics essential to acceptable quality. Because of the paucity of knowledge there is a divergence of opinion with respect to the significance and repeatability of such judgments and their value as a useful test in the hearing aid selection procedure.

Answers were sought to the following questions: (1) Group Reliability. Will the subjects tend to make the same judgments with respect to a given group of hearing aids? (2) Validity. Will the judgments made by the subjects correlate with the known acoustic characteristics of the instruments, i.e., will they tend to prefer the instruments which have the better acoustic characteristics and reject those with inferior characteristics?

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Two auxiliary questions were included to determine whether habituation to a given pattern of amplification and intelligibility had affected the preference judgments: (1) Will the subjects prefer the tonal quality of their own instruments? (2) Will the subjects be able to understand speech presented under quiet conditions equally well with all the experimental hearing aids? That is, will differences in the acoustic characteristics of the instruments be reflected in differences in speech discrimination scores?

In order to rule out factors other than differences in acoustic characteristics which might affect the judgments, the subjects were not permitted to see the aids and only experienced hearing aid wearers and conductively deafened individuals whose ears could be presumed to be free of physiological distortion were included. All hearing aids were set for their most nearly flat response to rule out personal preference for low-tone or high-tone boosts.

Selection of Hearing Aids

Technical data were secured from the manufacturers with respect to 26 different vacuum tube type hearing aids. Because changes in receivers and/or the number of vacuum tubes substantially alter the characteristics of a given model, the number of acoustic combinations considered for inclusion in the study totaled 160. The hearing

TABLE 1. Acoustic characteristics of hearing aids used in study.

Hearing Aid	*Maximum Acoustic Gain*	*Effective Range**	*Frequency Response*	*Acoustic Output*	*Limiting Factor*
1	70-75 db at 1000 cps; av. 500-3000 cps, 71 db	240 cps-3500 cps	Relatively flat	Maximum 129 db at 1000 cps	Automatic volume control
2	73 db at 1000 cps; av. 500-3000 cps, 65 db	650 cps-3600 cps	Peaked	Maximum 138-140 db at 1000 cps	Natural peak clipping
3	59.5 db at 1000 cps; av. 500-3000 cps 56.2 db	250 cps-3000 cps	Relatively flat	119.5 db at 1000 cps; av. 500-2000 cps, 118 db (60 db input; full gain)	Natural peak clipping
4	62 db ± 2 db; av. 500-3000 cps, 56 db	550 cps-3000 cps	Relatively flat	121 db at 1000 cps; av. 500-2000 cps, 115 db (60 db input; full gain)	Natural peak clipping
5	62 db at 1000 cps; av. 500-3000 cps, 60 db	250 cps-1700 cps	Markedly peaked	112 db at 1000 cps; av. 500-2000 cps, 114 db (50 db input; full gain)	Natural peak clipping

*Measured 15 db down from the highest area and at a level which provided at least 35 db gain. These are manufacturers' data. Laboratory measurements showed the effective range for HA 3 to be from 330-2700 cps and for HA 4 from 450-2950 cps, narrowing the assumed difference between these two instruments. All other measurements proved to be close to those given.

aids were categorized and compared with respect to (1) flatness of the frequency response curve, i.e., the relative amount of frequency distortion; (2) effective frequency range; (3) maximum acoustic gain and (4) type of limiting. As a result of the analyses and comparisons, it was possible to select five hearing aids for inclusion in the study which ranged in terms of comparative acoustic characteristics from gross differences to relatively small differences. The aids used were described and labeled with respect to the relative flatness of the frequency response and the relative amount of gain available. The terms good, fair and poor were used to describe the relative linearity of the frequency response with respect to gain. When a given frequency response pattern was designated as good, the implication was that it was better than the response of either instrument classified as fair or poor. The classifica-

tion did not imply superiority in terms of ideal or optimum characteristics. The hearing aids used were described as follows: (1) Hearing Aid 1 (GHG)-Good, High-Gain; (2) Hearing Aid 2 (FHG)-Fair, High-Gain; (3) Hearing Aid 3 (GLG-1)-Good, Low-Gain, One; (4) Hearing Aid 4 (GLG-2)-Good, Low-Gain, Two; (5) Hearing Aid 5 (PLG)-Poor, Low Gain. They were arranged in four pairs: (1) HA 1 vs. HA 2. (2) HA 3 vs. HA 4. (3) HA 3 vs. HA 5. (4) HA 1 vs. HA 3. Comparisons of the acoustic characteristics are given in Table 1.[1]

Comparison of Hearing Aids

Eight paragraphs were selected which were believed to have little innate appeal so that the subjects should find it relatively easy to think of *how the material sounded* rather *than what was being said*. The paragraphs were recorded and played in the order of recording, but the presentation of the hearing aids was alternated in order to insure that any variability with respect to the quality of recording, differences in sound pressure level, or differences in the interest level of the material would affect the judgments uniformly. The material was presented at 60 db re normal speech reception threshold. The low-gain aids were set for 50 db gain at 1000 cps, the high-gain aids for 60 db. When HA 1 and HA 3 were compared the gain was set at 50 db for each instrument. An 'expert' jury was employed to select the aids actually used in the study. Any instrument which sounded 'different' from others of its kind, i.e., same make, model and receiver, was excluded. All subjects had adequately fitting earpieces and used the ear in which a hearing aid was customarily worn. The subjects were tested individually. Each subject listened to a one-minute recording as reproduced by the first hearing aid of a pair. Immediately following this he listened to a second one-minute recording as reproduced by the second hearing aid. He was then asked which he preferred and for any comments or description of differences he cared to make. The subjects were not pressed or urged to describe the differences, but they were asked for them and all impressions were recorded. Each subject was told that the experimenter wanted to know if he could detect differences in the quality of speech as reproduced by different hearing aids and if these differences were important to him.

Results and Interpretation

A total of 51 subjects were given the quality-judgment test. All of them were adult males ranging in age from 24 to 55 years. The data reported herein are on 34 subjects who met the criteria for selection and were tested in accordance with the experimental procedures established following the pilot study.

Hearing Aid 1 vs. Hearing Aid 2 (Good High-Gain vs. Fair High-Gain). The first comparison was between two high-gain aids. HA 1 had somewhat better frequency range and less frequency distortion than HA 2. The aids were subjected to a total of 31 comparisons. Twenty-eight of the subjects preferred HA 1 to HA 2. Eighteen of the subjects considered it 'a lot better.' Ten considered it 'a little better.' The

[1]These comparisons were made on the basis of data secured from the manufacturers.

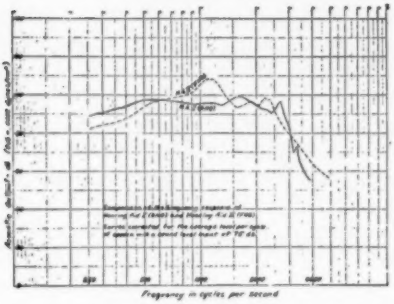

FIGURE 1. Comparison of the frequency response of Hearing Aid 1 (GHG) and Hearing Aid 2 (FHG). Curves are corrected for the average level per cycle of speech with a sound level input of 75 db.

significance of the difference, 28 to three, is obvious on the basis of inspection. The difference when evaluated by means of a chi-square test of significance for a 50:50 hypothesis produced a score of 18.58, which could occur by chance less than one time in 100. Hence, it is concluded that there were differences in the acoustic characteristics of the two aids that affected the reproduction of the speech samples and were detected by the hard of hearing subjects. Twenty-nine of the subjects volunteered a description of the tonal quality of one or both instruments. The subjective terms most commonly used in describing HA 1 and contrasting it with HA 2 were: 'clearer' and 'softer and more mellow.' HA 2 was frequently described as 'tinny.' One subject said that the *s*'s whistled' and another that the 'sibilants were bad.' It was also described as 'distorted' and having 'too much vibration.' The frequency-response curves obtained on the actual instruments used are plotted in Figure 1. These curves are corrected for the average level of speech per cycle, after Rosenblith *(1)*, and are believed to be more representative of the way speech is reproduced by the aids than would be shown by a comparison of the uncorrected curves.

Hearing Aid 3 vs. Hearing Aid 4 (Good Low-Gain vs. Good Low-Gain). The second comparison was between two good low-gain aids. These aids had almost identical acoustic characteristics except for a small difference in effective frequency range. They represented the best characteristics available in the low-gain class and were deliberately chosen to represent a very small difference in terms of desirable acoustic characteristics. It was originally believed that HA 3 had somewhat better response than HA 4 from 250 cps to 500 cps. However, the actual laboratory measurements showed even less difference in frequency response than had been assumed.[2] Out of 34 comparisons, 13 subjects preferred HA 3. Four of them thought it 'a lot better' and nine considered it a 'little better.' Sixteen subjects preferred HA 4. Six of them considered it 'a lot better' and 10, 'a little better.' Five subjects rated the instruments 'the same.' Many of the 'a little better' judgments were obtained by forcing the subjects to choose between the instruments even when they felt that they sounded alike. Some of the comments were: 'both good; both sound the same,' 'both all right,' 'both had depth and strength.' A chi-square test was given to determine the significance of the difference between the choices. The chi square was .1379. A difference score of this size could be expected frequently on the basis of

[2]Laboratory measurements showed the effective range for HA 3 to be from 330-2700 cps and for HA 4 from 450-2950 cps.

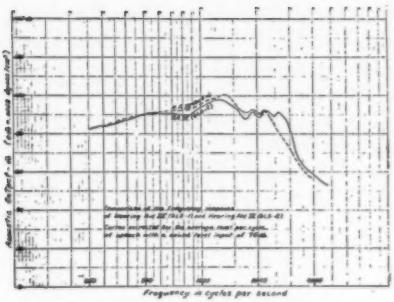

FIGURE 2. Comparison of the frequency response of Hearing Aid 3 (GLG-1) and Hearing Aid 4 (GLG-2). Curves are corrected for the average level per cycle of speech with a sound level input of 75 db.

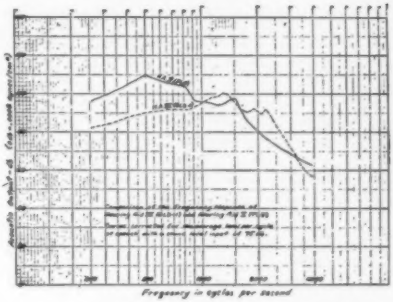

FIGURE 3. Comparison of the frequency response of Hearing Aid 3 (GLG-1) and Hearing Aid 5 (PLG). Curves are corrected for the average level per cycle of speech with a sound level input of 75 db.

chance. It can be concluded that the acoustic difference between the aids was not substantial and not enough to be readily detected. The frequency response curves, corrected for average level of speech per cycle, are shown in Figure 2.

Hearing Aid 3 vs. Hearing Aid 5 (Good Low-Gain vs. Poor Low-Gain). These two instruments were paired because they represented gross differences in terms of desirable acoustic characteristics. HA 3 was representative of the best characteristics obtainable in a low-gain hearing aid. HA 5, on the other hand, was typical of the poorest or most distorted frequency response pattern found in commercially available instruments. The receiver used provided a marked nonlinear response. The low tones were markedly accentuated and the response in the higher tones was very poor. Because of frequency distortion, the effective frequency range was unusually narrow. HA 5 was rejected unanimously by the subjects. Only two subjects considered HA 3 to be 'a little better'; 32 subjects considered it 'a lot better.' Twenty-seven of the subjects volunteered information as to the way the instruments sounded to them. Most of the comments were limited to HA 5 and reflected their intense dislike for this instrument. Typical comments were: 'Where did you get that one?' 'Worst hearing aid I ever had on in my life.' 'Do I have to listen to that one again?' 'Sounds like four walls falling in—lots of reverberation.' Most of the men noted an 'echo' effect. The frequency response curves, corrected for average level of speech per cycle, are compared in Figure 3.

Hearing Aid 1 vs. Hearing Aid 3 (Good High-Gain vs. Good Low-Gain). HA 1 and 3 were paired in order to provide a comparison between the quality of speech reproduced with a relatively large high-gain aid and a smaller low-gain aid. It has often been contended that the quality of speech reproduced by the larger hearing aids is superior to that of the smaller instruments. Out of 30 comparisons, 23 subjects preferred HA 1, and seven

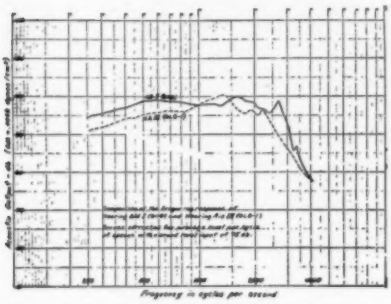

FIGURE 4. Comparison of the frequency response of Hearing Aid 1 (GHG) and Hearing Aid 3 (GLG-1). Curves are corrected for average level per cycle of speech with a sound level input of 75 db.

preferred HA 3. This difference was evaluated by means of a chi-square test. The difference, chi square 7.5, was found to be significant at the one per cent level. The results show a definite preference for the larger instrument that had relatively better acoustic characteristics. It should be noted, however, that the margin of preference was not a dramatic one for the group as a whole. While eight subjects considered HA 1 to be 'a lot better,' 15 considered it to be only 'a little better.' A number of the subjects noted that HA 1 was 'smoother,' 'clearer' or 'easier to listen to.' The closeness of the decision for many of the subjects is evident from some of the subjective comments: 'Both clear, both good; first one very little better.' 'More mellow, not much difference.' 'Very, very slight edge.' A comparison of the frequency response curves, corrected for the average level of speech per cycle, is given in Figure 4.

Comparison of Subjects' Aids with Experimental Aids. Out of 17 comparisons, eight showed a preference for an experimental hearing aid and seven a preference for the subject's own aid. Two comparisons resulted in a tie. It is noteworthy that none of the subjects asked to compare HA 2 (Fair High-Gain) or HA 5 (Poor Low-Gain) with his own instrument. There was apparently no tendency on the part of these subjects either to cling to the sound pattern they were accustomed to or to prefer one of the experimental aids.

Speech Intelligibility Scores. Discrimination scores using standard PB lists were secured for 18 subjects while wearing each of the five hearing aids. In addition, scores on three aids were secured on one subject and with two aids on another. Only seven out of 115 test scores were below 94 per cent and only two below 90 per cent. The data indicate that the subjects were able to understand equally well with any of the experimental aids. The data do not indicate the relative ease of understanding. It was quite evident that greater concentration was necessary to understand speech reproduced by some of the aids than by others and a number of the subjects made spontaneous comments to this effect. It is quite possible that if the same tests had been given in a background of noise, there would have been significant differences between test scores.

CONCLUSIONS

The experimental results verified the original hypotheses: (1) Quality judgments made by conductively deafened individuals are reliable. (2) Quality judgments made by conductively deafened individuals are related to, and will reflect differences in, the acoustic characteristics of the hearing aids.

It is clear from this experiment that conductively deafened individuals tend to make the same judgments with respect to the quality of speech reproduced by wearable hearing aids. The choices were amazingly definite and unambiguous. They were able to make these comparisons after listening to each hearing aid for but one minute. All of the subjects considered the listening period ample. None of them asked to listen to an aid a second time before arriving at a decision. The results enable one to place considerable confidence in the subjective reactions of the conductively deafened individual to different hearing aids. His judgments are related to real differences in the faithfulness of sound reproduction, differences which he can recognize and which are important to him. The high degree of agreement among the subjects rules out the factor of personal preference for tonal shading as being an important consideration in making these judgments. This kind of individual does not become habituated to a given pattern of reproduction and his judgment is not altered by physiological distortion. It is clear that the differences noted were related to differences in the acoustic characteristics of the instruments. The subjects preferred the instruments which had better acoustic characteristics and found no difference between the two aids which were almost identical. While the subjects could understand speech satisfactorily while wearing any of the hearing aids, they expressed strong and definite preferences for certain instruments and these preferences correlated with the known differences in the physical characteristics of the instruments.

The implications of these experimental facts are as follows: (1) Certain hearing aids reproduce the original sound pattern with greater fidelity than others. (2) Quality judgments made by conductively deafened individuals are a valid indication of the 'goodness' of the acoustic characteristics. They are not based on personal predilections for certain tonal shadings, on habituation to a given reproduction pattern or on physiological distortion. (3) The conductively deafened individual is able to recognize poor quality reproduction and is sensitive to it. Under conditions of low ambient noise he can understand a distorted speech pattern, but he does not like to listen to it.

Clinical Implications

As a result of these findings it is suggested that clinical audiologists use conductively deafened subjects as one means of determining differences in acoustic characteristics and rating the instruments used in their hearing aid selection procedures. It is also suggested that a quality judgment test be used in selecting hearing aids for conductively deafened patients. A quality judgment test may often be the best criterion in the selection of a hearing aid for a conductively deafened individual. It can be used with confidence when other measures, such as speech discrimination tests given in noise and tests of tolerance, fail to differentiate among the instruments.

Summary

Thirty-two subjects with conductive type losses were asked to judge the quality of speech reproduced by five different vacuum type hearing aids ar-

ranged in pairs for comparison. The hearing aids used were chosen as typical of differences in acoustic characteristics found in wearable hearing aids. They represented a range from the best to the poorest characteristics. Only subjects with conductive type losses were used because they could be assumed to have no inner ear distortion which might affect their judgments. The results showed: (1) that the 'typical' acoustic differences in the hearing aids were sufficient to result in real differences in the quality of the reproduced speech and (2) that the subjects were excellent judges of these differences. They were able to select with amazing speed and certainty the aid from any given pair with the better acoustic characteristics.

Acknowledgment

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CHARACTER LINKAGE THROUGH WORDS

Our verbal linkage with life is not merely a word-linkage, it is a character linkage *through* words. Speech defects not caused by actual organic malformation are understood, most often, as character defects, as an expression of some basic failure to work out a right relationship with life. Stammerings, stutterings—these and other speech difficulties are now widely recognized as having their roots in emotional disturbances: irrational fears, guilt feelings, hostilities. But such 'speech defects' as habitual dullness, pomposity, sarcasm, nagging, whining, monologuing, irrelevant meandering, oversweetness, lack of tact, platitudinizing, pedantry, and a meticulous indiscriminate stressing of details to the disadvantage of over-all significance—these, too, should properly be regarded as 'character defects'; as evidence that the individual has, for some reason inherent in his emotional experience, failed to continue his psychological growth. (From *The Mature Mind* by H. A. Overstreet. New York: W. W. Norton and Co., Inc., 1949.)

A Diagnostic Approach to Combined Techniques in Aural Rehabilitation

• *Charles Hutton*

Many clinicians seem to agree with Carhart (*1*) that an auditory training program should be designed to meet the needs of the individual with a hearing loss. That is, the speech discrimination errors he makes should be analyzed and these auditory confusions should be modified within the limitations imposed by his hearing loss. However, in the realm of the other principal sensory channel, vision, utilized by the hard of hearing for the understanding of speech, there seems to be widespread disagreement concerning effective procedures. Newby (*11*) advocates the synthetic rather than the analytic approach. Ronnei (*13*) parallels Carhart by suggesting that training be directed at specific speech sounds, and Pauls (*12*) states the teacher is far more important than the method. Probably the reason for these conflicting viewpoints is the fact that visual clues usually by themselves, produce only *35* to *55* per cent speech intelligibility (*5, 6, 15*). In other words, no matter how effective the method or the teacher, visual clues are not likely to provide enough information for efficient communication. While this restriction on visual intelligibility is generally recognized, the writer feels the implications for rehabilitation training have not been effectively utilized. In order to appreciate these implications it is necessary to understand that a parallel restriction applies to auditory intelligibility under certain conditions. In many instances where the client with a cochlear-8th nerve pathology has a discrimination loss severe enough to warrant rehabilitation services, auditory training will not lead to a normal discrimination score. Thus the restriction on auditory training is similar to that for visual speech training, except that auditory intelligilibity is generally higher and may provide enough information for communication under optimum conditions.

Another way of looking at these two restrictions involves the confusions which result from the limited information available to the client. There are certain groups of phonemes the members of which are more likely to be confused with each other than they are with other phonemes. For example, [p], [t] and [k] are frequently confused with each other when presented by auditory stimuli. Studies (*3, 8, 10*) and observations suggest that there are about 12 such groups of phonemes, the members of which are likely to be confused with each other. However. there is relatively little confusion between groups. For example, [t] is not likely to be confused with any of the nasal consonants. A parallel exists for visual

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confusions where [p], [b] and [m] are likely to be confused with each other but not with [k] and [g]. Data (*4*, *9*, *17*) suggest that the number of visual confusion groups which is sufficiently contrastive between groups to furnish usable information to the listener is approximately eight.[1] Thus it becomes obvious that there is nothing wrong with teaching the identification of phonemes by visual stimuli, but it would be in error to expect as many correct identifications as would be achieved by auditory stimuli. With this operational limitation, the reader may wonder what justification exists for teaching visual clues. The reason, as illustrated by the above two auditory and visual confusion groups, is that in certain instances there is little similarity between auditory and visual confusions. The phonemes [p] and [t], which are likely auditory confusions, are not likely visual confusions while [p] and [m], which are likely visual confusions, are not likely auditory confusions. It is apparent that in the combining of the two sensory discrimination channels, each channel makes some unique contribution to intelligibility. It has been the writer's experience (*6*) that when auditory and visual stimuli are effectively combined in aural rehabilitation, phoneme intelligibility is high enough for effective communication. The following section will present the specific steps used in combined habilitation and show the effects of such training.

[1]The number of confusion groups for any one individual varies according to his ability to make auditory and visual discriminations. Also, the boundaries between adjacent groups are apparently more definite in some instances than in others and the groups do not have the same number of members.

Procedure

The writer has formulated, for pedagogical purposes, a series of steps useful in teaching phoneme recognition to persons with hearing disorders. Many of the ideas presented in these steps are from Carhart (*1*), Fairbanks (*2*), and Van Riper (*16*). For preschool aged children the procedures have of necessity been accompanied by language developmental training. Prior to the initiation of training the client had gone through a diagnostic program which revealed the specific phoneme errors made by auditory, visual and combined stimuli. The Semi-diagnostic test (7) was found useful for this purpose. Early in the program the client compiled, with the aid of the clinician, a log of adverse listening conditions which were utilized by the clinician. The steps were as follows:

1. The concept of speech sounds or phonemes was explained to the client. For readers, it was important to differentiate between phonemes and alphabet letters. Contrast of orthographic and phonetic transcriptions was made, noting that the sounds to be worked on were the ones he missed on the diagnostic tests previously administered. It was appropriate at this point to discuss briefly the nature and course of aural rehabilitation.

2. The first error phonemes, chosen on the basis of frequency of error, frequency of occurrence, audibility, and visibility were introduced and the auditory and visual characteristics of the phoneme were described. If the client exhibited articulatory errors that were related to the hearing loss, appropriate tactile and motokinesthetic clues were added.

3. The client was bombarded with allophonic variations of the error phoneme. This and the following presentations were made in an ideal listening situation, i.e., four to six feet, face to face, with optimum amplification.

TABLE 1. Mean pre- and posttraining discrimination scores in per cent.

Clients	*Auditory*			*Visual*			*Combined*			*Ages*		
	Pre %	*Post* %	*Diff* %	*Pre* %	*Post* %	*Diff* %	*Pre* %	*Post* %	*Diff* %	—50	50-59	60+
18 clients	64.5	70.2	5.7	40.8	44.3	3.5	78.1	86.4	8.3	7	4	7
6 combined	55	65.6	10.6	50.8	55.9	5.1	66.6	84.5	17.9	5	1	0
6 Auditory	46.2	60.7	14.5	43.4	45.2	1.8	67	80.6	13.6	4	1	1
6 Visual	52.4	57.4	5	36.6	47.6	11	73.2	83.8	10.6	3	1	2
6 Age 50+	66.2	70.5	4.3	40.6	50.2	9.6	78.7	86	7.3	0	2	4

4. Drill was conducted on identification of the error phoneme in isolation (very short), syllables, and familiar words. Outside assignments paralleling the steps were begun at this point. All assignments were structured so the clinician could evaluate the effectiveness of the assignments.
5. Practice was given in error phoneme discrimination in syllables and words, progressing from maximum to minimum phonemic contrast and from one word to three or four word series. Likely auditory, visual and combined confusions were presented and discussed. Attention was called to the decrease in the number of phonemic confusions when auditory and visual stimuli were combined.
6. Training was given in error phoneme discrimination in connected materials—short phrases, sentences and short paragraphs. Materials were graded for the particular client. (In the opinion of the writer, if the client scores less than 50 per cent or more than 90 per cent it is doubtful whether much learning took place.)
7. Drill on error phoneme discrimination in noise and also at greater distance, i.e., 20-25 feet was presented. This situation proved somewhat difficult for even the best listeners, depending on the noise levels used. For this reason it was important that the preceding steps be mastered in the above listed order before this step was attempted.
8. Drill was presented on structured conversation in small groups, at first without and then with background noise. Listening experience with a number of speakers was provided. Conversation which rapidly shifted from one speaker to another was practiced.
9. Adverse listening conditions of the client were modified. The physical setting in which the listener had to communicate was modified to his advantage. For instance, he learned to pick out the most advantageous listening positions in large rooms and to keep as far away as possible from environmental noises. If there was one speaker the client had particular difficulty understanding, training in speech improvement was offered to this speaker.

Examination of the procedures involved in steps one through five and step seven indicates a type of training which is basically phonemic in character. The other steps involve connected speech and environmental considerations. While it might appear superficially that these procedures are basically a restatement of the well-known analytic and synthetic methods, the writer feels there are two basic differences: (1) the particular training given any one client is determined by his diagnostic results and (2) effective results are dependent upon the use of combined auditory and visual stimuli.

The effects of the diagnostic approach to combined training are illustrated by 18 clients seen during the last two years. Fifteen of the clients had cochlear-8th nerve losses and three had mixed losses, ranging from 20 db to 93 db in the 500-2000 cps region, with an average loss of 47.1 db. The age range was 11 to 74 years with a mean of 45.5 years. Rehabilitation involving the above procedures was administered by student clinicians and supervised by the writer. Live-voice developmental SD forms (7) were used for the pre- and post-training testing of 11 clients by student clinicians. The 1959 SD revision was used on the other seven clients with the writer serving as speaker for visual and combined testing. The test results, reported in Table 1, are based on about eight hours of training (one semester) for each of 16 clients and 16 hours of training (two semesters) for each of the two remaining clients. In some instances clients had received training prior to the period for which the test results are reported and some are candidates for further training. Eleven clients used their own aid, four used an auditory training unit and three used no amplification. With minor exceptions, primarily for demonstration purposes, all rehabilitation procedures were administered with combined stimuli.

Results

The gain in combined intelligibility of 8.3 per cent for the 18 clients (row 1) appeared to be a product of gains in both auditory and visual discrimination. In order to examine this idea more closely, the six clients showing the largest gain in combined scores were grouped. These clients, presented in the second row, again demonstrated gains in both sensory channels. In fact, the amounts of gain for auditory and combined stimuli approximately double the gains shown by the 18 clients and the amount of visual gain was also somewhat greater. For both of these groups of clients about two-thirds of the gain in combined intelligibility seemed to be attributable to gains in auditory discrimination. This observation suggested examining the scores of the six clients showing the most gain in auditory discrimination, the scores of which appear in the third row. The mean auditory gains of these clients was considerably greater than that of any other group. However, they exhibited little gain in visual discrimination and apparently as a consequence did not make as much gain in combined intelligibility as one might expect from the large increase in their auditory scores. The finding that this group made substantial auditory gain may have been influenced by the fact that as a group they had the lowest pretraining auditory scores. Examination of the fourth row, consisting of the six clients showing the largest visual gain, discloses that they likewise had the lowest pretraining visual scores. Since this latter group made only a small auditory gain, they did not have as much combined gain as either of the other above two subgroups. Thus it appears that the client who is to make the most gain in combined intelligibility must not depend on gain in only one of the two sensory channels.

There are some further restrictions on maximum gain for combined stimuli. The individual pretraining auditory and combined scores of the six clients who exhibited the most combined gain (row 2) do not differentiate them from the other 12 clients,

but without exception their pretraining visual scores were moderate (40 per cent), to high (65 per cent). This finding suggests that the client who is to benefit from combined training must develop some proficiency in visual speech discrimination before he will achieve maximum benefit from combined stimuli. Further support for this view can be found in the fact that of the eight clients with pretraining visual scores of less than 40 per cent, the mean gain for combined stimuli was only 6.2 per cent. These findings concerning the utilization of visual clues parallel those previously reported for phonemes (*6*), where it was found that only those phonemes which had moderate or high visibility benefited substantially from combined stimuli. It is also seen from the age columns in Table 1 that of the 12 clients who showed the most gain for combined and auditory stimuli, only three were above the age of 50 and only one was above age 60. These data suggest an age limitation to maximum benefit from combined training based in part on the small gain in auditory discrimination. This age limitation is demonstrated in the fifth data row where the six clients above age 50 showing the most gain in combined discrimination are presented. They exhibit little auditory gain, considerable visual gain, and thus, like the subjects in the row above, less combined gain than one might expect. In addition, for the six showing the most combined gain (second row), the sum of the auditory and visual gain is less than the amount of combined gain, while for the older group the sum of the auditory and visual gains was almost double the amount for combined gain. As Hudgins (*5*) has pointed out, the synthesizing of sensory information occurs at a cortical level, so this lack of efficient combining of stimuli in the above 50 age group may indicate a central rather than a peripheral limitation. It seems reasonable to conclude from these data that the client above age 50 will not greatly benefit from combined training, but two modifiers should be attached to such a statement. First, the pretraining visual scores for this group were generally lower than 40 per cent, and as indicated above, this seems to place a restriction on gain in combined training. Secondly, two of these made large gains on all three tasks.

It should be noted that not all subjects improved in all categories. The Wilcoxen rank-order test (*14*) indicated that only the auditory and combined scores demonstrated improvement significant at the 1 per cent level. In some instances there was a known physical basis which could have adversely affected the rehabilitation program. For example, one presbycusic had a continuing history of minor cerebro-vascular hemorrhages; a postmeningitic, age 16, incurred an increase in hearing loss of 15 db at 1000 cps and a 25 db increase at 2000 cps during the course of training.[2] Despite these adverse influences, the posttherapy mean difference between the auditory and combined scores was greater than the pretherapy difference, even for the above 50 age group. In addition all individual posttherapy combined scores were higher than either the posttherapy auditory or the visual scores.

[2]The subject did not have a hearing aid nor was amplification being used at this stage in training.

These data, together with those of Hudgins (5), demonstrate the practicality of utilizing combined stimuli over a wide range of hearing disabilities. As a supplement to these demonstrations, the writer's experience with a similar number of very young children indicates that the use of the procedures outlined herein produces very large changes in apparent discrimination ability in the same amount of therapy time.

Summary

A rationale for combining auditory and visual stimuli in aural rehabilitation has been presented. The rehabilitation program outlined also stipulates the use of diagnostic materials to determine the course of the training program which is phonemically oriented. Application of these procedures to a group of 18 clients indicated that those who showed the most gain for combined stimuli also showed substantial gain in both auditory and visual discrimination. On the other hand, those who made the largest amount of gain in auditory scores tended to make little gain in visual discrimination and only moderate gain in combined discrimination. The group making the largest gain in visual discrimination exhibited even less combined gain. The data further suggested that clients under the age of 50 are more likely to benefit from combined training than those above age 50.

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Test-Retest Consistency of Clinical Hearing Aid Tests

- *Freeman McConnell*
- *Eileen Fine Silber*
- *Douglas McDonald*

A major function of audiologic personnel in the rehabilitative treatment of hearing impaired individuals is to assist in the selection of a suitable hearing aid. Such a service of necessity implies a means of determining how well a person may be expected to perform communicatively with a hearing aid. Advances in electronics have been accompanied by a wide range of hearing aid types and models, as well as growing public acceptance of the wearable hearing aid. The need therefore increases for proven test materials and procedures in evaluating the acoustic reception of various instruments when worn by hearing impaired persons.

A primary objective of the hearing aid is to enable the wearer not only to hear, but to *understand*, the speech of others. A crucial problem for the audiologist lies in the fact that although hearing aid amplification may provide improvement in sensitivity for speech, it frequently does not improve the finer auditory discrimination on which understanding for speech is dependent. This latter capacity is in part a physiological function involving an individual's ability to perceive sound stimuli transmitted from auditory nerve endings to the brain. To evaluate this function, the audiology clinic must have at its disposal test materials which can be used to investigate an individual's ability to discriminate, or understand, speech sounds through hearing alone. Phonetically balanced word lists (Harvard PB-50's, CID W-22's and the PBK-50's) have had wide clinical use as measures of speech discrimination ability in the evaluation of hearing aid performance capacity.

While the clinical audiologist does not usually purport to select a hearing aid solely on the basis of objective test results to the exclusion of subjective appraisal techniques, speech audiometric measures obtained with the hearing aid are commonly used as an important guide in the individual handling of a patient. In view of the findings which

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The first portion of this study is adapted from material presented at the 1959 Annual National Conference of the American Hearing Society, Miami Beach, Florida.

have been reported by Miller (*3*, *4*), further clinical investigation of the test-retest consistency of speech discrimination scores in a clinical population appears indicated. Because considerable emphasis has been placed on both the aided discrimination score and the aided speech reception threshold in predicting how an individual will function with a hearing aid, the repeatability of test results obtained in a regular clinical situation needs to be determined to validate their continued use with confidence.

The clinical impressions of the writers were that speech discrimination and speech threshold tests with hearing aids have adequate test-retest reliability to warrant their continued use as measures which can help predict the manner in which a hearing impaired person will perform communicatively with the hearing aid. The present study was designed to determine the test-retest consistency of such tests performed with a sample population of hearing aid wearers in a routine clinical situation. Two sets of data were collected. The first portion of the study dealt with results obtained on an immediate test-retest basis, while the second set of data included similar test results on a remote test-retest basis. The testing populations for the two aspects of the study were not identical. The first portion of the study was designed to determine the test-retest reliability for speech discrimination scores and speech reception thresholds when the tests were repeated by different clinicians with the same subject wearing the same hearing aid on the same day. A second portion of the study was planned to determine the test-retest reliability of the tests when repeated by a different or the same clinician, but two weeks or more following the first test, and with the subject wearing the same type, but not the identical, instrument.

Immediate Test-Retest

Subjects. The test population of 40 included 24 male and 16 female hard of hearing individuals, the majority of whom were adults, but four of whom were under 16. The age range was 10 to 82 years, with a mean age of 47 years. The types of hearing loss were inclusive of two conductive, 18 mixed and 20 sensori-neural loss cases. Each of the subjects had requested clinical assistance in selection of a wearable hearing aid and had previously undergone otologic evaluation. The mean hearing loss, as indicated by the unaided speech reception threshold, was 46.8 db with a standard deviation of 14.5 db. The mean discrimination score was 74.4 per cent; individual scores ranged from 16 to 100 per cent with a standard deviation of 19.4 per cent.

Test Materials and Equipment. All tests were administered in a two-room sound-isolated suite through an Allison 21 speech audiometer. Both unaided and aided speech audiometric test items were presented by monitored live voice. The hearing aids worn by the subjects were from consigned clinical stock, or in the case of some previous hearing aid wearers, the hearing aid tested was the subject's own aid.

The Harvard spondees were used for the speech reception threshold. Discrimination lists included the PB-50's, the CID W-22's and the PBK-50's. The list used with a particular individual was previously determined

by the regular clinician. For example, in instances where a veteran patient was being seen, the W-22 lists were routinely employed for the entire clinical evaluation, and were thus the measure used by the experimenter.

Procedure. The experiment was carried out as part of routine clinical procedure for patients for whom hearing aid evaluation was being performed. The experimenter came into the test situation in which a regular clinician was working during a half-day period with a particular subject. He administered by monitored live voice the battery of speech hearing tests with a given instrument, chosen previously by the clinician. Later during the examination, but not immediately succeeding, the clinician repeated the same battery of tests with that aid. About half the time the experimenter tested an aid during the latter part of the examination, using an instrument with which the regular clinician had previously obtained performance data. Each subject used a volume control gain setting which enabled him to hear speech comfortably at a 40 db level in the manner described by Carhart (*1*).

During the period of the experiment as many as five regular staff audiologists were engaged in hearing aid evaluation services. Thus, it was possible for the experimenter to compare his results with aggregate results obtained by five other persons. As a second comparison, the results obtained by the first tester were compared to those of the second tester. In this way, variability in test results which would be anticipated both from different speakers presenting the test lists and from the order in which the tests were given was permitted to demonstrate its influence on the test-retest consistency.

TABLE 1. Comparison of immediate test-retest mean discrimination scores of 40 hearing aid subjects obtained with the same instrument under two test conditions on one day.

	Mean Discrimination Score %	*Difference between Means* %	*SE Difference* %	*t Score**	*Coefficient of Correlation*
1. Experimenter vs Other Clinicians					
Experimenter	74.0	1.7	9.8	.1094	.84
Regular Clinician	72.3				
2. First Test vs Second Test					
First Tester	72.6	1.2	9.8	.7666	.83
Second Tester	73.8				

**t* value of 2.023 required for .05 significance level, df-39;
t value of 2.708 required for .01 significance level, df-39.

TABLE 2. Comparison of immediate test-retest mean speech reception thresholds of 40 hearing aid subjects obtained with the same instrument under two test conditions on one day.

	Mean SRT db	*Difference between Means db*	*SE Difference db*	*t Score**	*Coefficient of Correlation*
1. Experimenter vs Other Clinicians					
Experimenter	24.3	1.6	7.5	1.441	.68
Regular Clinician	25.9				
2. First Test vs Second Test					
First Tester	26.7	3.1	7.5	2.765	.67
Second Tester	23.6				

**t* value of 2.023 required for .05 significance level, df-39;
t value of 2.708 required for .01 significance level, df-39.

Results. The results of the study are shown in Tables 1 and 2. Data were analyzed by means of the product-moment correlation technique and the *t* test, using the difference method (*2*). The *t* values obtained indicated that neither the difference between speakers nor the difference in test order was statistically significant for the discrimination score data. Test order, however, appeared to be an influencing factor resulting in a statistically significant difference in speech reception thresholds (Table 2.)

The coefficients of correlation for both conditions of discrimination testing were almost identical. The values obtained suggest that for the clinical population of this study the test results demonstrated good repeatability, both when comparing tests presented by one person throughout or by five different clinicians and when comparing the first set of test results obtained with the second set, with clinicians randomized.

Correlations for the aided speech reception thresholds were less high, though a substantially positive relationship was found to exist. The fact that the second tester achieved significantly better levels of hearing (23 db mean speech reception threshold as compared to a mean of 26 db) may indicate that a learning factor was operative in enabling the patients to respond to the spondee items at lower intensity levels as their familiarity with the words increased. Tillman and Jerger (*5*) have reported such an effect may occur if time is not taken by the clinical worker to familiarize the subject with the test vocabulary preceding the initial threshold test. An alternative explanation may be that as a patient becomes more experienced to listening to speech through hearing aids, he learns to tolerate higher degrees of amplification for the aids tested last and therefore raises his own comfort level with respect to the volume he

permits. Inspection of the individual data revealed that 28 of the 40 subjects maintained on the second test a speech hearing level equal to or better than that obtained from the first test.

Remote Test-Retest

Inasmuch as 28 of the 40 subjects in the first study were experienced hearing aid users, findings based on data from their test results might be expected to differ from results based on testing new hearing aid users only. It could be conjectured that experience in listening to amplified speech through the hearing aid would result in greater test-retest consistency. Since the audiologist uses speech hearing test scores to help predict the functioning with an aid which the new user may anticipate wearing, it was thus considered necessary to repeat certain aspects of the first study with a group confined to a population who had not had previous hearing aid experience. Furthermore, instead of comparing two sets of test results obtained on the same day, the first experimental plan was revised in the second study to compare test results obtained on the day of the hearing aid selection procedure with those obtained from two weeks or more later when the patient returned to the clinic for a regularly scheduled follow-up visit.

Thus, additional variables were added to the conditions under which objective measures of the performance of the hearing aid were obtained. First, the amount of lapsed time between tests was much greater. Since clinical predictions are usually based on the performance shown at the time of the hearing aid selection procedure, an underlying clinical assumption is that the patient will receive the same acoustic reception from the instrument which he later purchases on the basis of the clinical recommendation. Second, while test data in the first study were obtained using the same hearing aid for Test 1 as in Test 2 for each patient, the subsequent study compared test results for Test 1 obtained with a clinic consigned instrument used for test purposes with those for Test 2 obtained with the hearing aid purchased and worn by the subject on his follow-up visit. Again, it is assumed clinically that the recommended instrument as prescribed in the hearing aid selection procedure will be similar in its performance characteristics to the test instrument in clinic stock. It was hoped through the second study investigation to gain further information on the repeatability of test results which measure the performance characteristics of hearing aids in a routine clinical situation under the above varying conditions.

Subjects. Thirty-seven new hearing aid users, 16 male and 21 female, served as subjects for the second portion of the present study. Only three of these subjects were numbered in the first group. They ranged in age from eight to 80 years, with a mean age of 52 and only one of the group was under 16. The types of hearing loss represented were: three conductive, 17 mixed and 17 sensori-neural. The mean hearing loss as indicated by the unaided speech reception threshold was 47 db, with a standard deviation of 12 db. The mean unaided discrimination score was 72 per cent, and individual scores ranged from 14 to 100 per cent, with a standard deviation of 21 per cent.

TABLE 3. Comparison of remote test-retest mean discrimination scores of 37 new hearing aid wearers.

	Mean Discrimination Score %	*Difference between Means* %	*SE Difference* %	*t Score**	*Coefficient of Correlation*
Initial exam	70.1	1.8	9.1	1.2406	.92
Follow-up visit	68.3				

**t* value of 2.029 required for .05 significance level, df-36;
t value of 2.720 required for .01 significance level, df-36.

Test Materials and Equipment. The test materials and equipment were the same as for the first study. The single exception was that the hearing aids used in Test 1 condition were not the same as in the Test 2 condition, since the second test was done with the subject wearing the instrument purchased on the basis of the recommendation at the time of the first test, the results of which were obtained from a clinic consigned aid.

Procedure. All testing procedures were identical to those used in the first study. The second set of scores for each subject was obtained from two weeks to three months following the hearing aid evaluation, at which time the first set of scores was charted. The follow-up visit was a routine recheck appointment to assess the progress of the subject in his use of amplification. The comfort level speech reception threshold and discrimination score obtained on the recommended instrument at the original evaluation were compared with the same measures obtained with the subject wearing his purchased instrument at the time of the follow-up visit.

Results. Results of the statistical treatment of the data in the second study are shown in Tables 3 and 4. It may be noted that in spite of the

TABLE 4. Comparison of remote test-retest speech reception thresholds of 37 new hearing aid wearers.

	Mean SRT db	*Difference between Means db*	*SE Difference db*	*t Score**	*Coefficient of Correlation*
Initial exam	24.0	1.1	7.8	.8770	.48
Follow-up visit	22.9				

**t* value of 2.029 required for .05 significance level, df-36;
t value of 2.720 required for .01 significance level, df-36.

added variables of greater lapse of time between tests and employment of different hearing aids, the test-retest consistency scores for discrimination remained high and quite comparable to the results obtained under conditions in the first study. Twenty-three of the 37 subjects differed only by three errors or less on the two discrimination tests and only six showed more than a 10 per cent score difference on the second test. Differences in speech reception thresholds were six db or less on the second test for 25 of the 37 subjects. Aided speech reception thresholds on remote test-retest basis were less consistent, however, than discrimination scores, although moderately positive in correlation and the difference between means was not statistically significant.

Conclusion

The findings of the present study have given encouragement to the clinical position that present tests when administered by trained personnel do have reliable predictive value in the hearing aid selection procedure. The correlations obtained for discrimination test-retest results in particular were of a magnitude to indicate that even in the presence of clinical variables, the test score is, on the average, reliably indicative of a patient's functional status with respect to his ability to discriminate PB words. On the other hand, the findings do not in any way discount the importance of the experience and judgment of the audiologist who must be able to use the test findings along with all other information and impressions he receives to make the proper recommendation to the hearing impaired person who comes to him for assistance. Although the relationship between the test-retest values was substantially positive, the lesser degree of repeatability for speech reception thresholds obtained in the two samplings suggests that greater precision in measuring the gain characteristics of hearing aids with speech audiometry may be needed. In addition, tests which could help distinguish some of the more subtle differences in hearing aids than can be determined with present test materials would greatly enhance the services of audiology to the hearing impaired persons.

Summary

The present study was conducted to determine the test-retest reliability of speech audiometry measures with hearing aid wearers randomly selected in a routine clinical situation. Subjects for the first portion of the study included 40 subjects on whom aided discrimination scores and speech reception thresholds were obtained twice on the same day. A second group of 37 subjects was used to yield similar repeat data from tests performed from two weeks to three months after the first test.

Speech discrimination scores were found to have a markedly high degree of test-retest consistency in both test conditions as well as when the results obtained by one audiologist were compared with those obtained by other clinicians. Coefficients of correlation for discrimination tests ranged from .83 to .92. Aided speech reception thresholds were less consistent on repeat testing, with correlations ranging from .48 to .68. No significant differ-

ence was found between test results from both types of measures when tests were administered by different clinicians. In one of three comparisons involving test order, a significant difference between means was obtained in favor of results from the second test.

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THE TEACHING OF WISDOM

A value of particular importance to the growing child is the degree of emphasis placed on knowledge as contrasted to that placed on wisdom. Dr. Brock Chisholm, first director of the World Health Organization, has emphasized that we can and should start teaching children wisdom in the very early years. Professor Hans Thirring, of Vienna, believes that young people might be called wise who: (1) possess the knowledge and good will for a better understanding of, and insight into, themselves and their fellow men, (2) possess good sense for a proper order of rank of the various values and human issues, duties, and responsibilities.

Values are not usually black and white affairs; all good or all bad. Neither are people perfect, or all evil. Children need to be taught tolerance in not expecting perfection in others. The teaching of wisdom as applied to values involves passing on to younger minds a portion of this ability to judge people and situations. Later on, in the mature person, this ability is one of the marks of ripe experience. (From Halbert L. Dunn, 'How Well Is Your Family?' talk given at the Annual Public Health Institute, Victoria, B.C., April 19-22, 1960)

Urban School Services for Children with Hearing Loss[1]

• *Helen M. Wallace*

Since the Second World War, considerable progress has been made in the management of children with hearing loss. Better diagnostic tools have been developed, some medical and surgical treatment has improved, and the rehabilitation techniques have become more effective. Furthermore, our understanding of the broader needs of children and their families has advanced. This paper presents the findings on children with hearing loss as reported in a study of school services for handicapped children in urban areas.

Prior to the sixteenth century, there is only fragmentary information concerning the education and rehabilitation of deaf children (*3*). In the pre-Christian era, Aristotle and Pliny the Elder observed that there was some relationship between congenital deafness and lack of speech. Aristotle placed emphasis on sound and speech as the primary method of conveying thought and therefore of education. It had been assumed that since the deaf could neither speak nor understand speech that they were incapable of instruction and rehabilitation. The deaf were frequently classified with the mentally retarded and therefore excluded from educational opportunity. In the middle of the sixteenth century, Girolamo Cardano of Padua, Italy, initiated a more hopeful outlook by stating that the deaf could be taught. As early as 1555, oral education of deaf children of the nobility was carried on by a Spanish monk, Pedro Ponce de Leon in Spain. Also in Spain the first book written exclusively on the deaf by Juan Pablo Bonet appeared in 1620. Other works in many languages dealing with the education and intellectual status of the deaf appeared soon thereafter in England, Holland, Switzerland, France, and Germany. Two individuals, Abbe Charles Michel de l'Épée in France and Samuel Heinicke in Germany, were prominent in furthering the cause of the deaf in the latter part of the eighteenth century. De l'Épée founded the first public school for the deaf in 1755 in Paris, and Heinicke the first public school for the deaf in Germany. De l'Épée favored signs and Heinicke favored speech as the method of instruction. By the end of the eighteenth century it had been demonstrated that the deaf were capable of instruction.

In the United States, the first permanent public school for the deaf was founded in 1817 in Hartford, under the leadership of Thomas Gallaudet (27). This school was originally founded with support of private funds, and

[1]Research for this Article was confined to references in *Index Medicus*.

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shortly was given assistance from public funds. Similar schools were founded in New York City in 1818 and in Philadelphia in 1820. In 1869 the first special day school for the deaf was founded in Boston, and Sarah Fuller was placed in charge. In 1867 the Clarke School for the Deaf was founded in Northampton, Massachusetts; this was the first permanent American school to use the oral method of instruction. In 1883 the first oral school for preschool deaf children was opened in Chicago. In the same year Alexander Graham Bell established a private school in Washington to which both hearing and deaf children were admitted at the age of four and one-half years. In 1888 the Sarah Fuller Home for preschool deaf children was opened near Boston. These early schools were the forerunners of the system of state-supported schools for deaf children in the United States. In 1914 the Central Institute for the Deaf was founded in St. Louis by Dr. Max Goldstein who developed methods for training residual hearing of children. In 1938, Dr. Clarence D. O'Connor, Superintendent of the Lexington School for the Deaf, made an important contribution in advocating the use of hearing aids for children in schools for the deaf. (7). During World War II, considerable progress was made in the development of better diagnostic methods of detecting the type and degree of hearing loss in children. Since World War II, there has been developed improvement in hearing aids. Nursery school programs for preschool deaf children have been supported by chapters of the American Hearing Society and by parent groups. Agencies for vocational guidance and rehabilitation of the handicapped have now come to include youth and adults with hearing loss among the recipients of their services. Today most states maintain a residential school for the deaf, and many public schools in major cities provide special day classes for children with all degrees of impaired hearing. In 1954, it was reported that 27 per cent of all children enrolled in schools for the deaf attended special *day* classes or schools; most were students in public residential schools (27).

Procedure

During the winter of 1958, a questionnaire was sent to the health officers and superintendents of schools of each of the 106 cities of our country having a population of 100,000 or more according to the 1950 census. The questionnaire contained items regarding the types and numbers of handicapped children cared for in the public school system; the age of admission; the kinds of school facilities provided; the presence of established criteria for special educational placement, and the agency responsible for their establishments; the method of review of applications for special educational placement, personnel engaged in such review, frequency of review; organization of special education within the public school system; method of financing and costs of education of handicapped children; and the provision for transportation and attendant service during transportation of handicapped children to and from school. This paper will summarize the information provided on the questionnaires in regard to children with hearing loss.

TABLE 1. Age of school admission for children with hearing loss.

Age	*Number of Communities*	
	Hard of Hearing	*Deaf*
6 years	27	12
5 3/4 years	5	1
5 2/3 years	2	1
5 years	18	8
4 3/4 years	4	1
4 1/2 years	4	3
4 years	7	7
3 1/2 years		2
3 years	16	30
2 2/3 years		2
2 years		1
Age not stated	10	5
None cared for	5 (5.1%)	25 (25.5%)
Totals	98	98

RESULTS

According to the 1950 census, the 106 cities had a combined total population of 44,311,716 and a combined school enrollment of children aged five through 17 years of 7,192,100. Ninety-eight of the 106 cities responded. These ninety-eight respondent cities had a combined total population of 41,686,-921 and a combined school enrollment of children aged five through 17 years of 6,840,105. Ninety-three respondent urban communities provide some school services for children who are hard of hearing, and seventy-three communities do so for children who are deaf.

It is becoming more accepted that handicapped children, especially certain types, may benefit from school attendance during the preschool period. This policy has been recommended by a number of workers in the field (*2, 4, 5, 6, 11, 12, 13, 16, 21, 23, 25, 27, 30, 31, 32*). Therefore, the age of admission to school has considerable importance. Forty-six of the school systems admit deaf children under the age of five years, and 31 do so for the hard of hearing. On the other hand, 14 school systems delay the admission of deaf children beyond the age of five years, and 34 do so for the hard of hearing (Table 1).

Type of Educational Placement Provided. The type of educational placement provided and the quality of the service within the individual placement constitute some of the more important aspects of the care of handicapped children. To state it simply, the more services and the more comprehensive the services provided in a day school program (either special class or special day school), the less will be the need for a special residential school or home instruction.

TABLE 2. Type of educational placement provided for children with hearing loss.

Type of Placement	*Number of Communities*	
	Hard of Hearing	*Deaf*
Special day class alone	46	33
Special day school alone	9	18
Special day class and special day school	4	3
Special residential school alone	1	4
Special day class and home instruction	1	
Special day school and residential school		1
Location not stated	32	14
Not cared for	5	25
Totals	98	98

TABLE 3. Numbers of children with hearing loss reported.

Type of Placement	Number of Communities Reporting			
	With Service	Number	%	Children Reported
A. Hard of hearing children				
Regular class		30		2581
Special day class	46	42	91.3	2305
Special day school	13	9	69.2	352
Special residential school	1	1	100.0	2
B. Deaf children				
Special day school	22	17	77.3	1891
Special day class	36	33	91.7	1889
Special residential school	5	4	80.0	152
Regular class		6		151

Answers to these parts of the questionnaire were not fully complete. Nevertheless, it is possible to portray some picture at the present time. The most frequent plan for the hard of hearing and for the deaf children is a special day class alone as shown in Table 2. From Table 2 it should also be noted that a fair number of school systems provide special day schools alone for both the deaf and the hard of hearing. One community provides home instruction for children who are hard of hearing. Placement in a residential school occurs in five communities in the case of deaf children and in one community in the case of the hard of hearing.

A question was asked concerning the numbers of known handicapped children in the various types of educational placement. Again, this question was not fully answered by all reporting communities. However, from the answers provided, it is evident that more of the hard of hearing are in special day class, and that the deaf group are in special day school and special day class. Residential schools are still being used for children as indicated in Table 3.

The Method of Educational Placement. Ninety-one of the 98 reporting public school systems stated that they had criteria established for the educational placement of all types of handicapped children. Of the other seven school systems, one each had established criteria for children with cerebral palsy, for the blind, and for children with mental retardation; four did not answer this question.

In almost half of the public school systems, responsibility for establishing the criteria for educational placement of all types of handicapped children has been assumed by the local government, predominantly the local board of education. In slightly more than one-quarter, the responsibility has been assumed by the state government, predominantly the state department of education. The partcipation of the health deparment, either local or state, is very small. Individual disciplines were listed under local government by

16 communities; there was medical participation reported in seven of these 16 communities.

The board of education alone reviews the applications for special educational placement of all types of handicapped children in half of the public school systems. In no instance is such review done by the department of health alone. The review is carried on jointly by the two departments, education and health, in approximately one-fifth of the school systems. The recommendation of the practicing physician was acted upon without any agency review in only three school systems.

The number of professional personnel reviewing applications for educational placement of all types of handicapped children ranged from one in one school system to 12 in another school system. The most frequent number of participants was six in 18 school systems. In most school systems more than one professional person is responsible for the review of applications.

The type of professional person participating in review of applications is of the utmost importance. The most frequent types are the psychologist and the school administrator (the principal of a day school, a residential school, or a regular school in which a day class is located). The nurse and the teacher participate in about one-half of the school systems, the social worker and the school counselor in about one-third. There is limited participation by such personnel as the director of special education and the vocational counselor.

There was some type of medical participation in review of applications in all school systems except 14. It is surprising to find infrequent participation by certain medical specialists, e.g., otologist, pediatrician, ophthalmologist, orthopedist, and cardiologist.

It is considered essential that there be a careful review of all handicapped children, not only prior to educational placement, but also periodically during such placement and prior to withdrawal from such placement. The questionnaire asked for information on all three aspects. Ninety-six percent of the school systems indicated that they review all applications for all types of handicapped children prior to placement, 85 percent do so periodically during placement, and 70 percent prior to withdrawal from placement. Inquiry was also made regarding the frequency of periodic review of the children during placement. Forty-five percent of the school systems review children in special day class at least once a year, 39 percent review children on home instruction at least once a year, 32 percent review children in regular class at least once a year, 31 percent review children in special day school at least once a year, 17 percent review children in hospitals and convalescent homes at least once a year and nine percent review children in special residential schools at least once a year. The stated range of frequency of review varied from once a week in one special residential school and on home instruction, to a complete lack of review for children on home instruction in two school systems.

Because it is recognized that 'paper review' of children may not provide as complete a picture of the child, his progress, and his needs, as when the child and his family are personally seen, the questionnaire contained an inquiry regarding the provision of a team of

TABLE 4. Number of personnel provided for personal evaluation of children with hearing loss.

	Number of Communities	
Number of Personnel	*Hard of Hearing*	*Deaf*
One	9	8
Two	13	10
Three	13	11
Four	3	3
Five	2	
Six	1	1
Team	4	3
Clinic	1	1
Total replying	46	37
Total providing more than one person	37	29

personnel, either from the board of education or the department of health, who personally see and evaluate handicapped children. For children who are hard of hearing, 46 communities stated that they provided such a team, although only 37 of them provided a team of more than one person. For children who are deaf, 37 communities provided such a team, although only 29 of them provided a team of more than one person (Table 4). For both groups, the team was usually composed of not more than three people. A psychologist, an otologist and a physician, whose type was not stated, were most likely to be used. Other personnel used with some degree of frequency were the teacher, the nurse and the speech clinician. It is surprising to find that community facilities, such as those operated by a hospital, a health department, a voluntary agency, or crippled children's agency, were used rarely, and that personnel such as a social worker, school counselor, school physician and certain medical specialists (pediatrician and otologist) were used relatively infrequently (Table 5). In four school systems there was a team evaluation of deaf children without any medical participation; this same situation prevailed for hard of hearing children in three communities.

TABLE 5. Type of personnel engaged in team review of children with hearing loss.

	Number of Communities	
Type of Personnel	*Hard of Hearing*	*Deaf*
Nonmedical		
Psychologist	17	15
Teacher	12	7
Speech therapist	9	5
Nurse	8	5
Administration	6	4
Audiologist	5	4
Director of special education	4	4
Social worker	1	1
Counselor	1	1
Audiometrist	1	1
Medical		
Type not specified	21	14
Otologist	14	15
School doctor	1	2
Pediatrician		1
Community facility used		
Diagnostic and treatment center	2	2
Consultation clinic	1	1
Diagnostic team	1	
CC clinic	1	1
Miscellaneous		
Director of school health	1	1

Financial Aspects of Education of Handicapped Children. The source of financing the education of handicapped children is predominantly a combina-

tion of local and state tax funds (86 out of 98 communities). A tremendous variation exists in the proportion of local-state participation in financing, the most frequent method being equal sharing of costs by local and state governments. The most frequent method of allocation of funds used for education of handicapped children was on a 'per pupil' basis (32 communities); 'per teacher' or a 'per class' basis was used less frequently (12 and 15 communities respectively).

Transportation of Children With Hearing Loss to and From School. Fifty communities provide transportation for the hard of hearing to and from school and 48 do so for deaf children. Fifteen communities provide attendant service during transportation of hard of hearing children and 16 do so for deaf children.

Discussion

It is of course highly gratifying that almost all of the larger urban communities provide some school services for children who are hard of hearing. However, only three-quarters of the urban communities do so for deaf children. This lower percentage of urban community provision for deaf children is a reflection of the greater difficulty of providing services for the more severely handicapped and of the need for a team of highly skilled personnel in the hearing field.

Less than half of the communities admit deaf children to school during the preschool period. Furthermore, one-seventh of the urban communities delay admission of deaf children beyond the age of five years, and one-third of the communities do so for the hard of hearing. These findings illustrate the need to review the policy of admission for these two groups of children.

It is of interest that 60 communities provide either a special day class or a special day school for children who are hard of hearing, and 55 communities do so for the deaf. While there seems to be agreement that it is desirable that children who are hard of hearing receive their education in a regular school or in a special class of a regular school, there is no comparable agreement regarding the best plan for education of deaf children. A review of the American literature for the past 20 years discloses several points of view regarding the optimal plan for the education of children with severe hearing loss. Certain authors (*9, 12, 15, 18, 19, 20, 22*) recommend a regular school or a special class in a regular school; other authors recommend a special day school (*10, 26, 28*); still other authors recommend a special school for the deaf, either day or residential, for the early stages of their education, and a regular school at a later date (*1, 8, 24, 29*). Still other authors state that each individual child must be carefully evaluated and re-evaluated, and that there must be flexibility so that the child may be placed in one type of situation and later transfered to another when such transfer is indicated. This last group of authors state that the decision regarding type of placement of each child should be based upon a number of factors, including the degree of hearing loss; the availability of facilities locally; the individual physical and emotional needs of the child; the progress of language development; the suitability of the home and the capa-

bility of the parents (*14, 17, 33*). It is of interest that the literature contains no report of a study of this question.

Thirty-seven communities provide a team of more than one person to evaluate children who are hard of hearing and who may need special educational placement; 29 communities do so for deaf children. Because children with hearing loss and their families may have a variety of needs, i.e., medical, health, educational, social, psychological, recreational and vocational, it would be hoped that more and more the team approach would be used. It is curious also that community hearing facilities, such as those operated by a hospital, a health department, a voluntary agency or crippled children's agency, were so seldom used. The question might be raised regarding the need for personnel engaged in special education of children with hearing loss to consider such a resource.

Summary

This paper describes the results of a questionnaire sent to all 106 cities of the United States with a population of 100,000 or over regarding school services currently being provided for children with hearing loss. There is considerable variation in the range of services provided as a whole. Suggestions are made for further strengthening of such services, if children with hearing loss are to have the opportunity of reaching their full potential.

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HIGH-LEVEL WELLNESS AND COMMUNICATION

Barriers to communication, both in the inner and outer worlds of man, are hostile to life and militate against high-level wellness.

Fundamentally, the ability to communicate is bound into the substance of protoplasm. Every cell of the body can 'remember' in its own way. Pain can be buried in the tissues. Cells can remember hunger and become sensitive to chemicals. The life process at each point involves memory and requires communication.

It is at the point of intersection between the inner and outer worlds of the individual that communication becomes all important. Here it is that what we term loosely as our true self overviews the inner and outer worlds in ceaseless vigil. Open channels of communication in both these worlds offer the best chance for understanding to emerge and for the bringing of the two worlds into focus and harmony. In the outer world, limited access to information and narrowed channels of communication provide a never-ending battleground between the individual and the authoritarian who would like to distort facts and thus control the minds of people. Likewise, fixed and irrational beliefs maintained in the inner world of the individual saddle authoritarian mandates and obscure freedom of insight, thus tending to block understanding and adjustment. Man has simultaneously facilitated and complicated the struggle to communicate, through the invention of language. Words pin down associations, multiply them, and enlarge the world of man beyond what he can see, reaching outward to describe that which can be imagined. But they also open the way for the hidden persuaders to control the thoughts and actions of the individual through subliminal suggestion and subtle distortion.

High-level wellness relies heavily upon access to pertinent information and open channels of communication. (From 'What High-Level Wellness Means' by Halbert L. Dunn. *Canad. J. Pub. Hlth.,* 50, 1959, 447-457.)

Childhood Nonorganic Hearing Loss

• *George J. Leshin*

During the 1958-59 school year, staff audiometrists of the Oregon State Board of Health administered screening and individual hearing tests to 123,-428 children in kindergarten through ninth grades. Of this group, 4,589 or 4.1 per cent of the initial test group; 1,239 or 16.1 per cent of teacher-nurse referrals; and 1,928 or 45.2 per cent of rechecks of the previous year's hearing loss cases failed to pass the test criteria. In Oregon, a child is referred for medical attention if he indicates an average 20 db loss in the speech range (500-2000 cps) or an average 25 db loss in the high tone range (3000-6000 cps) on an individual test. This applies to either ear. These standards were developed with the assistance of the Conservation of Hearing Committee of the State Medical Society.

Otologic Screening Clinic

It was recognized that at the time of audiometric testing in schools some children would have had colds or temporary conditions which would perhaps clear up spontaneously. In order to prevent over-referrals to private physicians from the audiometric testing program in the schools, the otologic screening clinic was brought into existence. Otologic clinics, as the name implies, were clinics in which medical screening was done by an otologist following audiometric testing. The otologist at the clinic decided which children currently needed medical attention and referred these children to their private physician for such attention. While all parents received an invitation to bring their children to the otologic clinic, some preferred to go directly to their private physician. During the 1958-59 school year, 1,902 children were seen at the otologic clinics and of these 877 or 46.1 per cent were referred to their private physician for medical care.

The otologic clinic team, in addition to the otologist, consisted of an audiologist, a medical-social consultant and the public health nursing staff. A careful medical history was taken at the initial interview. Following this the child, in most instances, received an ear, nose and throat examination and a repeat audiometric test. In a limited number of cases, it was difficult to reconcile the medical with the audiometric findings. In these instances a more complete audiological workup, including speech audiometry, play techniques, and counseling, were undertaken. In addition, the medical-social consultant interviewed the parent in an attempt to gain further insight. A review of the statistics indicated that in approximately two per cent of the cases the hearing loss was of nonorganic origin.

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Nonorganic Hearing Loss

Ramsdell (2) delineates several types of nonorganic hearing loss. In the *psychogenic* or *functional* type, the nerve impulses actually reach the brain but are not consciously heard. The most common variety of psychogenic hearing loss appears to be of a *hysterical* nature and is produced by deep-seated emotional conflicts within the personality structure, manifesting itself through the sense of hearing in this instance. Any other sensory organ or part of the body can be similarly affected by ongoing hysterical process. A psychogenic hearing loss case is to be distinguished from the *malingerer* who consciously knows he can hear but pretends to be deaf for a variety of reasons.

It appears likely to this writer that there is a continuum between pure conscious malingering at the one extreme and true psychogenic or functional deafness at the other extreme. The majority of the 48 cases of nonorganic hearing loss detected in the otologic clinics appeared to have elements of both extremes. Most of these children during repeat audiometry and with counseling by the audiologist could be made to reverse hearing losses ranging from 25 to 100 decibels, unilaterally or bilaterally. In most instances the hearing was found to be essentially normal. It is possible that a case or two of true psychogenic deafness may have gone undetected, but this does not appear likely in view of the otological, audiological and socio-psychological findings.

Despite the fact that most of the children reversed the initial nonorganic loss, the element of pure conscious malingering was open to question. In many instances there appeared to be operant an unconscious element of preservation of emotional defenses in the face of real or imagined loss of familial affection or attention. That is, the nonorganic loss appeared to be at least partially based upon unconscious motivations rather than on a deliberate preconceived plan of action.

Cases of Nonorganic Loss

The medical-social consultant's role was an important one in terms of evaluating the possible complex familial and environmental factors contributing to the nonorganic hearing loss and in bringing into play the services of pertinent educational and rehabilitation agencies. For example, in one instance, two youngsters, aged three and four, were brought into the otologic clinic for hearing evaluation. Neither of the children had developed intelligible speech or language patterns and appeared not to respond to sounds around them. Both youngsters appeared to be bright and alert, understood gestures and physical action around them, but failed to understand speech and had no intelligible speech of their own. In the post-clinic conference, it was discovered that both parents were profoundly deaf and used sign language in the home. The home was situated where there was very little opportunity for the children to play with other children. Medical examination proved negative and audiological evaluation indicated completely normal hearing in both cases. Arrangements were made for speech stimulation therapy at a nearby hearing and speech center and the children were also enrolled in a nursery school with normal hearing youngsters. In a matter of six months,

the children had acquired a considerable amount of speech and language and are communicating rather freely within the scope of their present vocabulary. As a result, it appears likely that these children will be able to be enrolled in a normal classroom, although they will need some continuing special education assistance for some time to help overcome the present speech and language retardation deficiences.

In another instance, the medical-social consultant was instrumental in bringing about a beneficial change in the attitude of a parental couple toward their 12-year-old adopted child who scored an average of 70 db bilateral hearing loss in the school hearing testing program. At the otologic clinic, medical examination was essentially negative. The audiometric retest again indicated a 70 to 80 db bilateral loss. An audiological evaluation was done because of fluctuations in responses to the initial tones. The audiologist, suspecting nonorganic loss, chatted with the boy and was able to relax him sufficiently to obtain a valid, consistent test, indicating normal hearing. The post-clinic conference held by the medical-social consultant with the parents revealed that this was an adopted child who had a repeated school history of apparent loss in vision and in hearing. The child seemed to enjoy the attention his physical problems brought from his teachers, parents and his peers. Consultation with the parents revealed their concern that the child felt less wanted and loved than his two sisters, who were natural children of the parents. Further consultation with the parents helped to bring about changes in attitude toward the child which, at this date, have appeared to considerably reduce his fears. In recent months, there has been no recurrence of the suspected nonorganic hearing and vision difficulties.

Summary

In the Oregon Hearing Conservation Program, 48 cases of suspected nonorganic hearing loss were discovered among 1,902 children seen at otologic clinics sponsored by the Oregon State Board of Health, Maternal and Child Health Section. In these instances, the otologist, audiologist, medical-social consultant and local health department staffs worked together to: (1) reconcile medical, audiological, and psychosocial data to arrive at the true level of hearing, (2) attempt to determine familial and environmental factors contributing to the nonorganic hearing loss and (3) outline and implement a course of action to remove or relieve the need for the child to use nonorganic hearing loss as a personality mechanism.

Newby (*1*) points out the need for the whole area of nonorganic hearing problems in children to be explored further. The nationwide incidence, the various factors influencing children to assume a hearing loss and the best approaches to this problem regarding medical and educational follow-up need research emphasis.

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Double Frequency Auditory Screening in Public Schools

• *Max C. Norton*

• *Elizabeth Lux*

During the past decade there has been a demand for rapid and reliable methods of auditory screening of large numbers of individuals. In most schools and industrial plants the installation of hearing testing facilities to accommodate both group and threshold audiometry is not feasible. An alternative is the use of a simplified pass-fail type screening technique which does not require sound-treated testing areas. The double-frequency screening technique was devised for this purpose. Adequate justification is needed for the testing of two frequencies instead of five frequencies now used in most standard audiometric screening tests.

The present study is a part of an extensive longitudinal validation study now in process, and differs from recent studies (*6*, 7) in sampling technique, validation methods, instruments used, testing procedure and the treatment of the data.

Glorig and House (*1*) checked the validity of the 2000 and 4000 cps double-frequency screening concept in a study of 1128 audiograms classified according to diagnosis. In 98.24 per cent of the cases with a 15 db loss at 4000 cps in either ear, there was no greater loss at any lower test frequency. In 99.02 per cent of the cases with 15 db loss at either 2000 or 4000 cps, there was no greater loss at any lower frequency.

Merklein and Fox (*4*) tested the hearing of 220 subjects with the 4000 cps tone at an intensity level of 15 db and 35 db as a means of predicting the upper limits of hearing losses at frequencies below 4000 cps. The problem was to determine whether a person who responded to the 4000 cps tone would be able to hear equally well or better at frequencies below 4000 cps. In 98.6 per cent of the ears tested, the measured hearing losses at frequencies below 4000 cps were less than the 4000 cps loss as indicated by the single-frequency test.

The problem was to determine whether a double-frequency pass-fail type test administered in a quiet classroom environment is practicable. It involved the establishment of several test conditions essential to the development of rapid pass-fail tests for children from five to 18 years of age. The test results were compared with the results of the standard sweepcheck

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test administered in an acoustically controlled testing environment.

Procedure

One thousand and forty-six subjects were selected for the study on the basis of age, grade level and school; 641 eighth grade children, 199 fourth grade children, 194 first grade children and 12 special training children. The sampling was made from schools which represented a cross section of the socio-economic structure of the community. The ages ranged from six to 14 years.

The procedure was based on the following test requirements: (1) Reliability and validity of the double-frequency method needed to be established in a relatively quiet classroom environment wherein the ambient noise level was uncontrolled. (2) Reliability of the double-frequency method needed to be established through a comparison of the accuracy of these test results and the results of the standard five-frequency (sweepcheck) method which was to be administered in an acoustically controlled testing area. (3) Test procedure of the double-frequency method needed to be more rapid than the five-frequency (sweepcheck) method. (4) Fatigue, boredom, distraction, and inattention needed to be considered within the scope of the problem. No advanced preparation for the classroom tests was undertaken except to notify the classroom teacher that the test would be administered according to a pre-determined schedule.

One tester was assigned to each of the three tests, and no tester was permitted to review the results of any test other than those he himself administered until each day's schedule was completed. Student monitors recorded the result as each test was administered. The testing schedule was arranged so that each subject was administered the three tests within a four-hour period.

The following criteria were used to compare the accuracy of each of the two screening methods: (1) the percentage of accurate tests, (2) the percentage of false-negative tests (under-referrals), (3) the percentage of false-positive tests (over-referrals), (4) the percentage of accuracy calculated according to grade level, (5) the percentage of false-positive tests (over-referrals) calculated according to grade level, and (6) the percentage of false-negative tests (under-referrals) calculated according to grade level. An additional comparison was made of the time required to administer each of the screening tests.

Double-Frequency Screening Tests. The ambient noise level during the double-frequency screening tests varied from room to room according to the age of the children and the location of the room and the school. The over-all sound pressure levels measured on the C scale of a General Radio Sound Survey Meter varied from 55 to 60 db.

The test was administered at the individual child's desk at a sound pressure level of 15 db at 2000 and 4000 cps. The subject was instructed to listen for the tone and to raise his hand when it was heard. If the subject failed to respond, a 2000 or 4000 cycle tone was presented at a sound pressure level of 35 db.

Five-Frequency Screening Tests. After the double-frequency tests were completed in the classroom, the subjects

TABLE 1. Double-frequency and five-frequency test results according to school and grade level.

	School				*Grade Level*				
	A	*B*	*C*	*D*	*3*	*4*	*1*	*ST**	*Totals*
Number Tested	316	325	216	189	641	199	194	12	1046
Double-Frequency Testing									
Number of accurate tests	294	291	196	161	585	178	169	10	942
Accuracy in percentage	93.0	89.5	90.7	85.2	91.3	89.4	87.1	83.3	90.1
Total number of positive (failed) tests	51	67	27	51	118	36	37	5	196
Number of false-positive tests	22	34	20	37	56	20	25	2	103
Percent of positive tests in error	43.1	50.2	74.1	52.9	47.5	55.6	67.6	40.0	52.6
Over-referrals in percentage	7.0	10.5	9.3	14.3	8.7	10.1	12.9	16.7	9.8
Number of false-negative (passed) tests				1		1			1
Under-referrals in percentage				0.5		0.5			0.1
Five-Frequency Testing									
Number of accurate tests	293	303	203	165	596	183	175	10	964
Accuracy in percentage	92.7	93.2	94.0	87.3	93.0	92.0	90.2	83.3	92.2
Total number of positive (failed) tests	52	47	20	45	99	29	31	5	164
Number of false-positive tests	23	18	13	22	41	14	19	2	76
Percent of positive tests in error	44.2	38.3	65.0	48.9	41.4	48.2	61.3	40.0	46.3
Over-referrals in percentage	7.3	5.5	6.0	11.6	6.4	7.0	9.8	16.7	7.3
Number of false-negative (passed) tests		4		2	4	2			6
Under-referrals in percentage		1.2		1.1	0.6	1.0			0.6

* Special training—intermediate level.

were sent to a special testing room in the school plant where the pure-tone sweepcheck screening tests were given. The sound pressure levels in the testing room varied from five to 10 db depending on the acoustical properties of the room and its location within the school. The over-all sound pressure levels varied from 30 to 40 db.

The sweepcheck test was administered at a sound pressure level of 15 db at the five frequencies of 250, 500, 1000, 2000 and 4000 cps. The subject was instructed to raise his right hand for the right ear and the left hand for the left ear.

Discrete-Frequency Air-Conduction Threshold Test Number 1. The subjects who failed either or both of the screening tests were sent to the mobile hearing unit where the Discrete-Frequency Air-Conduction Threshold Tests were administered. The threshold tests were performed with an ascending-descending technique. The tones were presented in the following order: 1000, 2000, 4000, 1000, 500 and 250 cps.

Equipment. The Ambco Oto-Chek 700-S audiometer was used for the classroom screening tests. The instrument was designed as a double-frequency screener for testing at 2000 and 4000 cps at fixed sound pressure levels of 15 and 35 dbs. A single earphone was used. The sweepcheck tests and the threshold tests were administered with individual ADC basic portable audiometers, Model 53A.

Results

Test Accuracy. (1) The total accuracy of both screening methods is given in Table 1. The data indicate that the double-frequency tests administered in the classroom were 98 per cent as accurate as the five-frequency tests administered in an acoustically controlled testing area. (2) Of a total of 1046 subjects screened, one passed the double-frequency test who subsequently showed a loss on the threshold examination which was greater than 15 db in any of the five frequencies tested (false-negative), whereas the five-frequency method yielded six false-negative tests. All of the six subjects receiving false-negative tests revealed a hearing threshold which was higher at 2000 and 4000 cps than at 1000, 500 and 250 cps. (3) The test results showed greater variance between the screening methods in the occurrence of false-positive tests. In this category the five-frequency tests yielded 2.58 per cent less false-positive tests than the double-frequency method. (4) The accuracy of both screening methods increased with the age level of the subjects. The five-frequency method showed a higher total percentage of accuracy at each grade level. Fewer false-postive tests were incurred by both screening methods at grade eight than at grades one and four, while not more than one per cent of the test

Table 2. Analysis of individuals failing either or both screening tests who showed more than 15 db loss in any frequency in which the losses were greater in frequencies 250, 500, through 1000 cps than in frequencies 2000 cps and 4000 cps.

Total screened	1046
Total failing threshold	229
Total failing threshold with greater loss in or below 1000 cps than above 1000 cps	8
Percentage of total screened	.765
Percentage of ears tested (458)	1.75
Percentage of total number of ears screened (2092)	.385

failures incurred in any of the grade levels tested were false-negative.

Analysis of the Validity of the Double-Frequency Concept of Auditory Screening. Of the 229 subjects who failed either or both screening tests and took the threshold test, eight showed a loss which was greater at 250, 500 and 1000 cps than at 2000 and 4000. This total constituted approximately 3.5 per cent of the total number of subjects who failed either or both screening tests. Of the total subjects screened (N=1046) less than one per cent (.765) showed a hearing loss which was greater at 250, 500 or 1000 cps than at 2000 and 4000 cps (Table 2).

In terms of individual threshold samples (N=458), 1.75 per cent revealed a hearing loss which was greater at 250, 500 and 1000 cps than at 2000 and 4000 cps. Of the total number ears tested (N=2092), less than one half of one per cent (.385) was included in this category. These data suggest that in at least 98 per cent of the threshold tests, the loss was no greater in the test frequencies of 250, 500 and 1000 than at 2000 and 4000 cps.

Discussion

Factors relating to the conditions under which the double-frequency tests were administered tended to create more false-positive but less false-negative results than the five-frequency method. It is inferred from these findings that in the use of such a rapid pass-fail type screening test the increase in false-positive tests would necessitate an increase in threshold audiometry. However, this factor may be offset by a lower occurrence of false-negative tests and a considerable increase in over-all speed of administration.

The results suggest that the difference in accuracy was the result of specific factors relating to the instruments and procedures. The following observations support this conclusion: (1) Since the administration of the double-frequency tests in each instance preceded the administration of the five-frequency tests, listener adaptation may have increased the accuracy of the responses to the five-frequency tone stimulus. (2) Calibration of the audiometers varied from plus to minus 1.50 db from the true value. (3) The use of binaural earphones as a noise-screening device in the administration of the double-frequency tests may have increased the over-all accuracy of the method.

Several advantages in the double-frequency method were noted: (1) While the testing time per subject varied from 10 to 12 seconds for the double-frequency method, the five-frequency method required 20 to 30 seconds per subject. The total time required to administer the test to the average-sized classroom (33 children) including preparation time varied from 12 to 15 minutes for the double-frequency method and from 20 to 40 minutes for the five-frequency method. This suggests that although the double-frequency method may be slightly less reliable than the standard five-frequency method, more children may be screened by the same personnel in the same length of time. (2) The younger children did not become fatigued or inattentive before the test was completed and the individual child seemed less tense in the presence of the other children in a familiar environment. (3) Little advanced preparation was needed by either the audiometrist or the

classroom teacher. At the fourth and eighth grade levels, desk assignments were issued and the class schedule was never interrupted. (4) The instrument was light in weight and easy to handle and test procedure necessitated no setting up or dismantling of instruments between class periods. This permitted the audiometrist to move from one class to another within a closely coordinated time schedule.

Conclusions

The advisability of testing at frequencies other than 2000 and 4000 cps must also await further evaluation. It would appear, however, that a screening procedure based on the testing frequencies below 2000 cps would require the use of an acoustically controlled testing area as ambient noise might affect the sound reception threshold at frequencies below 2000 cps when administered in an uncontrolled acoustical environment. Longitudinal studies are needed to evaluate more completely the implications of using double-frequency screening in public schools as well as medical offices and industrial establishments.

In the planning of an auditory screening program in the public schools, a double-frequency screening method should be used in conjunction with threshold audiometry. Discrete-frequency threshold audiometry must of necessity be used for medical referral purposes.

Summary

A study of double-frequency auditory screening was necessitated by a growing demand in public schools for rapid and reliable pass-fail type auditory screening methods where the use of sound treated testing areas or facilities are not available. The present study was undertaken to determine the practicability of using the double-frequency method for that purpose.

A sampling of 1046 subjects was taken from four schools which represented a cross section of the socio-economic structure of the community. The selections were made on the basis of age, grade level and school. The rapidity and reliability of the method were checked though a comparison with the standard five-frequency pure tone method now in use in many school districts.

On the basis of the results of the study, several conclusions were suggested concerning the effectiveness of the double-frequency method: (1) The double-frequency method appeared to be less reliable than the five-frequency method. (2) It was simpler and considerably faster to administer, and was less fatiguing for the testor. (3) As it was administered in a familiar classroom environment, it was less distracting for young children. (4) Less advanced preparation was needed in the administration of the testing schedule; moreover it did not necessitate the disruption of class schedules. (5) The long range implications of using double-frequency audiometry cannot be ascertained from a study of this nature. Proper longitudinal studies must of necessity be undertaken for that purpose.

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COMING IN THE NOVEMBER JOURNAL

1. 'The Speech Pathologist: His Activities, Attitudes and Interests' by Joseph Sheehan, Robert Hadley and Gerald White.
2. 'Audibility Avoidance in Non-Vocalized Stutterers' by Bruce Quarrington.
3. 'Attitudes of Mothers of Articulatory-Impaired and Speech-Retarded Children' by Kenneth Moll and Frederic Darley.
4. 'Temporal Evannation: A New Approach to Diagnostic Audiology' by Edgar Lowell.
5. 'Studies in Aphasia: Background and Theoretical Formulations' by Joseph Wepman.
6. 'Speech Problems of Patients with Multiple Sclerosis' by Mary N. Farmakides and Daniel Boone.

COMMUNICATION AND FELLOWSHIP

Communication—verbal, nonverbal, and possibly extra-sensory—is essential for the maintenance of life and well-being. Barriers to communication, both in the inner and outer worlds of man, are hostile to life and militate against high-level wellness. Each individual is lonely in his inner world and seeks fellowship with others. (From H. L. Dunn, 'What High-Level Wellness Means,' *Canad. J. Publ. Hlth.*, 50, 1959, 447-457.)

CLINICAL FORUM

Esther L. Herbert, Editor

• Some Techniques for Treating The Hypernasal Voice

In clinical use the term nasality refers to an abnormal vocal quality being heard by the auditor. Pertinent literature has indicated that the abnormal vocal quality is caused by the introduction of additional resonances. House and Stevens in their analog study of nasality (*J. Speech Hearing Dis.*, 21, 1956, 218-232.) conclude that the extra resonances are a function of the coupling of the nasal cavity to the vocal tract. Although nasality is commonly conceived as merely being an unpleasant vocal attribute, it may also be said to interfere with communication. The need for correction, therefore, is self-evident.

Insofar as the coupling action of the resonators, particularly the nose and mouth, produce the nasality, successful rehabilitation must have as its rationale the modification of the resonance chambers. One such modification has been indicated by the work of Harrington (*J. Speech Dis.*, 9, 1944, 325-344.) who found that there was differential movement of the velum during the phonation of different vowels. A study by Kelly (*Arch. Speech*, 1, 1934, 27-42.) also supported this concept in its conclusion that there were different amounts of nasal resonance inherent in various vowels. This information, with other factors, led to the McDonald and Baker (*J. Speech Hearing Dis.*, 16, 1951, 9-20.) concept of the critical ratio, that there is a critical point in the degree of closure of the nasopharynx. It is at this point that a characteristic ratio is established between oral and nasal resonance.

Obviously, exercises designed to diminish the size of the velopharyngeal lumen or to open wider the oral cavity will modify the characteristics of the speaker's resonators. Current rehabilitative procedures may be evaluated in terms of the criterion of modification of the resonating chambers.

Although auditory discrimination does not satisfy the criterion, per se, it is certainly one of the more successful methods that could be used by the clinician in the treatment of hypernasality. It would appear that its value lies in the speaker's ultimate recognition of his aberrant vocal quality. This recognition allows for either the unconscious modification of the resonating chambers or the knowledge that such a modification is necessary.

Blowing exercises are often used. There is, however, controversy relative to their usefulness. The chief arguments against the use of blowing exercises are: (1) The type of movements used in blowing are different from those employed in speaking. (2)

Contributions to Clinical Forum should be addressed to the Editor, *Journal of Speech and Hearing Disorders*, Los Angeles State College, Los Angeles 32, California.

Blowing exercises sometime result in the development of undesirable accessory movements, such as constriction of the nares and other facial grimaces. (3) Blowing exercises often result in failure and frustration, thus creating psychological problems. The chief arguments for the use of blowing exercises are: (1) Blowing exercises increase the mobility of the velopharyngeal structures. (2) If a patient is so emotionally disturbed by his different speech that he resists any training, some nonspeech activities, such as blowing exercises, may motivate him to continue. (3) Blowing exercises may be used to give the patient a feeling of being able to do something about his speech. Since blowing exercises help develop better muscular closure of the nasopharyngeal port, they also, therefore, help to modify the resonating cavities and must, according to our criterion, be considered as a useful tool in reducing nasality. There is a question, however, as to the methodology to be employed during these exercises. Is there any difference in velopharyngeal activity, or in motivation, if the nostrils are kept open or if they are manually closed by the clinician during the exercises?

Much success can be obtained with hypernasal voice quality cases through the application of the principles of orality. Through the use of this method of lowering the dorsum of the tongue and speaking with a wide open mouth, a larger and better oral passageway would be created, thereby facilitating the passage of the air stream through the mouth rather than the nose. Obviously, resonation is altered by such a technique. The experience of the writer indicates that the act of placing the dorsum of the tongue in a low position tends to move the velum slightly backward. If this observation is valid, then it may easily be seen that this will help to block the passage of the air stream into the nose. Clinicians have questioned the validity of lowering the dorsum of the tongue on the grounds that it is positioned no higher in cleft palate speakers than in normal speakers. There is no doubt, however, that lowering the dorsum would satisfy the criterion even if its original position in the mouth were normal. Such a change in tongue positioning would alter the speaker's resonance characteristics.

The development of both visual and kinesthetic awareness is of great aid in obtaining a low-placed dorsum. The clinician may develop visual awareness in several ways: (1) Drills before a mirror watching the soft palate ('gate' may be used with small children) open and close. (2) The patient may run the tip of his tongue along the middle ridge of his palate and watch in a mirror as the tongue touches the soft palate. Kinesthetic awareness as well as auditory discrimination may be developed by the following procedure: (1) Place a tongue depressor on the dorsum of the tongue and gently press the dorsum down as the patient phonates [ɑ]. (2) Ask the patient then to raise the dorsum while minimal restraining force is applied while continuing phonation. (3) As this activity proceeds, *request the patient to concentrate on the muscular movements.* Tape record this activity and compare it with nasality in previous recordings.

Vocal phonics, or the breaking of a word into its separate sounds, can be of importance in treatment of the hypernasal voice. The importance of

this technique will be suggested by the difficulties a patient has in carry over with the orality method. Useful practice can be obtained by exercises in separating single digits into their component sounds, e.g., wa-n, t-u, etc. Care should be taken to make sure there is maximum orality on every vowel sound. The consonants and vowels of the number should be gradually juxtaposed. Tape recordings of the digits should be made. A comparison can then be made with previously recorded sets of digits which were phonated in the 'old' way. There should be less nasality evident. Since every word contains a vowel sound, the patient can learn to achieve maximum orality on these vowels. The orality should tend to generalize to the consonants. This method of achieving orality on the vowels should be used in continuous speech.

When the patient uses a louder voice, his voice quality improves markedly. This improvement is probably due to the fact that when the intensity of the voice is increased, the mouth is opened wider than usual. Another successful attack upon the problem of nasality can be made by practicing good articulation which may require more orality than is usual for some patients. Its usefulness, therefore, may be based partially on its tendency to modify the resonating chambers.

The retraining of breathing and phonating habits is advocated as a good technique for treating the hypernasal voice on the grounds that hypernasality is, in a large part, due to an ineffective use of the air stream. It is believed, however, that the correct use of the air stream could be accomplished by other means such as blowing and orality methods.

Although several writers feel that much good can be obtained by changing the pitch of the hypernasal person's voice, Sherman and Goodwin (*J. Speech Hearing Dis.*, 19, 1954, 423-428.) have indicated that this would be of little or no value. Bloomer (*J. Speech Hearing Dis.*, 18, 1953, 230-246.) has also said that there is no clear indication of relationship between pitch, stress and palatopharyngeal action. Pushing exercises, as advocated by Froeschels (*J. Speech Hearing Dis.*, 20, 1955, 365-370.) do not appear to satisfy the criterion. It may be, however, that all these exercises have an indirect effect on the resonating chambers.

Sol Adler
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- **Unit Teaching in Speech and Hearing at the Elementary School Level**

Unit teaching of subject matter in the elementary schools has become an accepted practice. It seems to lead to more effective and interesting presentation of subject matter as well as longer retention on the part of the students. Speech and hearing clinicians have tended to think of their unit of teaching in terms of speech sounds, stuttering blocks, voice change, etc.; they have planned their lessons in terms of the specific goal towards which they are working. One of the problems encountered has been that the goals of the child may not coincide with those of the clinician. A speech problem may be avoided insofar as possible by the child. A direct approach to improving speech using drills, choral reading, isolated speech sound practice, ear train-

ing, etc., while convenient for the clinician does not always result in good learning. An effective procedure seems to be that of following a central theme or unit as a vehicle for speech correction. In this way the child remembers his speech work from isolated class to isolated class, and isolated sound to isolated sound; he relates his work to something within his environment and finds it more 'need centered' than a direct approach to his speech problem.

Using this central theme approach, a child when talking about a given subject, or in acting out a situation relating to a unit is required to use the best speech of which he is capable. Direct teaching is carried out as needed on sounds, words, blocks, etc. Units suggested by children with appropriate levels follow.

Suggested Units. (1) Early elementary: how to get better grades in school, how to get good speech if yours is not good, how Eisenhower became president, how to make friends, how to live on a ranch, how to fly jet airplanes, how to make money and things to do in winter or summer. (2) Later elementary: football, baseball, building houses, auto mechanics, how to collect coins, how to build airplanes, how to build boats, how to collect model cars, how hospitals help people, how to get a good education, etc.

An Example of Unit Teaching. If the topic is horses, discussions of the kinds of horses, what a horse should eat and how he should be cared for, provide ample group conversation. Speech practice in buying a horse, riding a horse, saddling a horse, feeding a horse and asking one's parent for a horse are high interest level topics for which children seem to feel good speech is important. Stories by the teacher with speech sound errors for ear training together with single sentences for practice all seem to be effective with this topic.

A primary purpose of unit teaching used in this way is to incorporate speech and hearing training into the child's 'reality' world. The child must feel the unit topic is a part of his experience if he is to make improvement in communication skills. Thus the unit taught should be familiar and of interest to each child in the group. Conversation in these units should be preplanned insofar as possible by the speech clinician to incorporate sounds which children with articulation problems need, feared words of children who stutter or whatever the case may be. Direct teaching should be done as part of the situation. When sufficient direct teaching is not possible, individual work before and after class or during a special period is very helpful. Units such as these, planned in advance to incorporate speech practice, have been found to be more effective with some groups of children than direct speech therapy. Using these procedures, children accept speech training as a normal part of their environment and relate it to their 'reality' world.

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• Comparison of Methods for Evaluating Electroencephalic Responses to Tones

In 1958 Withrow and Goldstein (*Laryngoscope,* 68, 1958, 1674-1699) described a procedure for electro-

encephalic audiometry (EER-Audio). In 1959 Derbyshire and Farley (*Ann. Otol., etc., St. Louis*, 68, 1959, 675-697) described another EER-Audio procedure. Basically, the procedures are similar, largely because the Withrow-Goldstein procedure developed from earlier suggestions by Derbyshire (*Electroenceph. clin. Neurophysiol.*, 8, 1956, 467-478.). Both procedures call for random presentation of auditory stimuli from a previously prepared schedule, and both require objective analysis of the electroencephalograms for possible responses to sound only after the test is completed. The principal difference between the two procedures is in the methods of rating possible responses and of determining whether these possible responses to sound occur more frequently than by chance. In the Withrow-Goldstein method a 'yes' or 'no' choice has to be made. Is there or is there not a response when a sound is presented? 'Maybe' is not permitted. The judgment is made on the basis of how much the EEG pattern seems to be altered during or following the presentation of a tone.

Statistical evaluation in the Withrow-Goldstein method calls for comparison of the number of responses to tones at a given hearing level to the number of 'responses' or false-positives during the silent control-intervals. A table is given showing how many responses to six stimuli at a given frequency and intensity can be regarded as significantly more than chance occurrence. In the Derbyshire-Farley method the components of each possible response are described and evaluated. The person examining the records judges whether or not there is a change in the EEG pattern (a) with the onset of the tone, (b) while the tone continues, and (c) when the tone is turned off. Weightings are given to each of these components based on the nature of the changes according to a table of suggested values, and contributions from each portion of the responses are totaled for a single score. The same analysis is made of possible changes during the silent control-intervals. A statistical formula is given for comparison of numerical scores of the responses to tones and to controls in order to determine whether tones of given frequency and intensity elicit more than chance changes in the record.

The Withrow-Goldstein method of analysis has the advantage of simplicity in judgment of responses and in estimating thresholds. It has the disadvantage of requiring a little more experience in examining records before responses can be judged with certainty than is required by the Derbyshire-Farley technique. The Derbyshire-Farley method requires virtually no previous experience in analysis in order for a technician to apply it and none of the frustration involved in making many 'yes' or 'no' decisions. Consistency in judgment is the principal requirement. The Goldstein-Withrow method requires the presentation of at least six stimuli at each tone setting in order for their table of responses to be applicable. New tables can be determined for less than six stimuli at each setting but such a table would require more frequent clear responses than are ordinarily elicited in the EER-Audio. While the Derbyshire-Farley method also has greater validity when at least six stimuli are used at each setting, estimation of threshold can be made with fewer stimuli. This advantage is impor-

tant in instances when the patient awakens before the predetermined schedule is completed, and will not return to sleep without impractical anesthetic measures.

Experience in analyzing the same records by both methods shows that estimations of threshold are precisely the same when both methods can be successfully applied. However, the Derbyshire-Farley method has been successful in some cases, when the Withrow-Goldstein method cannot be applied: (a) when the child awakens before the completion of the test, and (b) when clear EER to tones are too few to permit valid comparison with controls according to a prepared table. On the basis of his experience the author is continuing to test according to the EER-Audio procedure described by Withrow and Goldstein but is analyzing responses according to the method described by Derbyshire and Farley.

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ROBERT GOLDSTEIN

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Letters to the Editor

The Editorial Staff assumes no responsibility for the opinions expressed in letters.

STUTTERING THEORY AND RESEARCH

Among the various speech and hearing problems, stuttering today probably represents the chief area of controversy and disagreement, and still remains an enigma in many respects. Possibly one of the main reasons for this relates to bias of previous investigators and to the large amount of research activity of past years which did not utilize present day levels of sophisticated research design. Goodstein (*J. Speech Hearing Res.*, 1, 1958, 359-376) in summarizing results of research over the past 25 years relating to one aspect of the problem, namely the relationship between functional speech disorders and personality including stuttering, states, 'In general, these methodological and conceptual limitations were so important that few, if any, generalizations were clearly suggested by these studies, emphasizing the need for more and better research.' With respect to stuttering, he states that due to methodological inadequacies, such as use of unvalidated instruments, small Ns and failure to cross-validate, few trustworthy generalizations were evident.

It appears significant that some progress is now being made in assessing previous research. The Goodstein appraisal of research related to one aspect of the problem, it is hoped, will lead to further appraisal in other aspects of the stuttering problem. The multitude of studies related to stuttering causality which were reported over the past 25 years could well bear the same type of scrutiny. It is enlightening that our present professional journals now employ the services of statistical consultants to assess and aid present-day research articles bearing on the subject, but it still leaves the mass of accumulated data of the past which has not received such attention. Unfortunately, those in the position of utilizing such data for instructional purposes may cite those studies which support their particular bias concerning the problem of stuttering, even though the research in many cases is not valid. Some texts describing the problem may also draw more heavily from research articles which tend to support a particular point of view. Other texts specializing in reporting every available source

without objective evaluation of the methodology employed serve to confuse the student because of the conflicting data. Most speech pathologists do not pretend to be statisticians and the job of evaluating the previous studies in this area should be performed by a professional person in this capacity.

It is quite probable that such evaluation, if it is carried out, will reveal large numbers of studies which will no longer appear valid. Certainly the healthiest result which might occur from this would be the re-exploration of previous investigations carried out with more highly sophisticated statistical design. This would lead to more objective research findings and theoretical formulations which would explain the problem of stuttering more fully.

It is hoped too, that present day exponents of theories of stuttering causation will exercise greater restraint until more objective evidence is available to explain the problem. There seems to be a natural desire for most speech pathologists to expound at length on particular theories which may be quite unsubstantiated. As a case in point, West (An agnostic's speculations about stuttering. In J. Eisenson (ed.), *Stuttering: A Symposium)* speculated that stuttering was biochemically induced inasmuch as 'no stuttering has been found among diabetics.' A study by Bolden, (M.S. thesis, Univ. of Wisconsin, 1955), however, which included questionnaires to physicians throughout the country inquiring whether, in their practices, they had met with diabetics who stutter, revealed many affirmative answers. In another text, (Berry, M. and Eisenson, J., *Speech Disorders)*, while the authors state that 'no attempt will be made to persuade the student about any one theory or explanation of stuttering,' a description of organic theories is presented, followed by the statement, 'About half of the adolescent and adult population do not belong to this "organic group."' No validation is offered in support of this statement.

In summary, the problem of stuttering may someday be more satisfactorily explained if three essentials are carried out. One is the continued exploration of the problem through objective experimentation carried out with adequate statistical measures, second is a review of previous research scrutinized as to validity and objectivity and third is appropriate restraint in formulating of theories of stuttering until more objective evidence is available.

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SPEECH CORRECTION IN THE U.S.S.R.

May I add a brief supplement to Black's report in the February, 1960, issue of the *Journal of Speech and Hearing Disorders*, on speech correction in the U.S.S.R. In 1958, I visited the U.S.S.R., where I interviewed mostly researchers but also the head of the speech correction program in Leningrad. In 1959, I visited an associated country, Czechoslovakia, and looked in on the speech program in the city Brno.

The speech clinician I visited in Leningrad was unfamiliar with American work. He knew the English journal, *Speech Pathology and Therapy*, but not the *Journal of Speech and Hearing Disorders*. He seemed particularly interested in American thought on stuttering and cleft palate. During our discussion of stuttering he showed me a hearing-aid-like, noise-generating device to be worn by stutterers. This device, if I remember correctly, had been announced several years ago with great hopes. It has now been abandoned because stutterers did not experience lasting improvement and found it cumbersome. He said that in his city there were early and late surgery schools of thought regarding cleft palate. He was in the process of introducing a 'new treatment' device called a 'floating obturator.' This device was put in the child's mouth at the age of two weeks. No difficulties were being experienced, and apparently patients can acquire good speech as well as undergo late surgery.

In Brno, Czechoslovakia, I visited a residential school for severely speech handicapped children (speech handicapped being defined as having more than 20 defective sounds). The program and teachers seemed to be excellent, but it was noted that direct auditory training practice was deliberately avoided in the procedures. I discussed stuttering rehabilitation techniques with a physician in a hospital. He was attempting to develop Pavlovian techniques and was already using a 'sleep' therapy in which patients are kept under sedation for about two weeks. It was reported to be effective with children but not with adults. The rationale for this treatment was that the enforced speech inactivity weakens existing neural connections in the speech centers in the brain and permits establishment of better connections upon resumption of normal speech activity.

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BOOK REVIEWS

Ernest H. Henrikson, *Editor*

Note: *Authors whose books are reviewed in the* Journal of Speech and Hearing Disorders *are provided opportunity to comment, if they so desire, on the reviews of their books. Reviews and comments are published together. The Publications Board and the Book Review Editor intend this policy to facilitate informed and balanced book reviewing in the interests of the profession served by the* Journal. *(See* Journal of Speech and Hearing Disorders, *24, 1959, page 425, for the statement inaugurating this policy.)*

BRODNITZ, FRIEDRICH S., *Vocal Rehabilitation.* Rochester, Minnesota: Amer. Acad. Ophthal. Otolaryng., 1959, Pp. 119. $2.00.

Written primarily for the otolaryngologist, this books presents 'a review of the indications, of the diagnostic considerations, and of the therapeutic approaches to vocal rehabilitation. . . . It is intended . . . to present to the laryngologist, in a concise form, those facts about the voice in health and disease which he needs in handling the patient with disturbed vocal function.' The author is himself a laryngologist who combines the rare (in this country) combination of training in the specialities of medicine and phoniatry. The combination has enabled him to present information which is both selective and authoritative, reflecting his own experiences in private practice and as a member of the medical staff of the Mount Sinai Hospital, New York City.

The need for the book is created in part by the separation of the professions of laryngology and speech pathology in the United States, a condition which exists to a lesser extent in Europe. The author assumes, of course, that the primary responsibility for treatment of the patient with a voice disorder rests in the hands of the physician, but he recognizes and stresses the importance of the development of a concept of 'functional laryngology that gives equal status to the functional as well as to the organic changes in a patient with an impaired voice.' It is this emphasis on the functional implications of pathology which makes the manual particularly useful to the speech pathologist as well as to the laryngologist.

The duality of professional training in laryngology and speech pathology is perhaps unfortunate, but must be accepted as one of the realities of our present day system of education and clinical practice. This book does much to bridge the gap, and to present to the laryngologist the objectives and treatment methods employed by a speech pathologist trained in the treatment of voice disorders. It also presents the speech pathologist with a brief statement of the methods and objectives of the laryngologist. Inasmuch as few laryngologists are prepared to deal with the functional aspects of voice, Dr. Brodnitz calls attention to the field of speech therapy, and he cites the American Speech and Hearing Association and its publications as a useful source of professional information about qualified therapists and the developing fund of knowledge in this field.

The book covers a good deal of information of practical value in its three main parts: (1) 'The Speaking and Singing Voice' (dealing essentially with the normal physiology and psychology of voice); (2) 'Functional Disorders of the Voice' (diagnosis and therapy); and (3) 'Organic Voice Disorders' (from the standpoint of vocal rehabilitation.) The coverage of topics includes a description of the breathing mechanism, aided by drawings, X-ray plates and kymograph records which are better than those usually encountered in textbook discussions of this topic; the action of the vocal cords with due reference to the current controversies over the explanation of cord vibration; the mechanism of functional voice disorders in singing and speech; the nature of psychogenic voice disturbances; general principles of vocal rehabilitation; preoperative and postoperative surgical management; drug therapy; physiotherapy; and special problems of diagnosis and treatment.

The manual is particularly interesting because the viewpoints and the clinical tech-

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niques described are evidently drawn chiefly from European sources. A quick perusal of the bibliography in comparison to recent books dealing with voice published in this country will illustrate this. More than half of Dr. Brodnitz' references are cited from foreign publications or have been written by specialists who received a great deal of their training abroad. In contrast to this, our textbooks typically carry few of these references, and generally neglect the valuable information on voice which is available in them.

Whereas it is not difficult to evaluate this manual—it is a good one, compact, authoritative, and practical—it is difficult to estimate its value to readers from the field of speech pathology. This difficulty arises because the reader must bring a great deal to his reading of the book. The very nature of the manual, which is designed primarily for the medically trained specialist, and the derivation of the materials from lectures prepared by Dr. Brodnitz for presentation at the American Academy of Ophthalmology and Otolaryngology limit to some extent its usefulness to the speech pathologist trained in the United States. Since it is not intended as a textbook, the treatment of some topics is necessarily brief, and the review of the literature is selective rather than exhaustive. The lecture style and the somewhat discursive character of the book may deceive some readers, leaving them with the impression that the treatment of the subject is superficial. In such a case, perhaps the fault, dear Bruti, is in ourselves.

Despite these limitations, speech pathologists and therapists can surely find much information here of suggestive and practical value. I have found from personal experience that many of the methods which Dr. Brodnitz describes can be quite effective when used perceptively. In my opinion this manual is well worth the thoughful attention of speech therapists interested in the functional management of voice disorders.

H. Harlan Bloomer
University of Michigan

Author's comment: The new policy of the *Journal* of giving the author a chance to 'review the review' is a remarkable innovation and an example of journalistic fairness that other scientific publications would do well to imitate. Dr. Bloomer's understanding and generous appraisal of my book makes the comment on his review a pleasant task.

Dr. Bloomer is right in assuming that one of the main goals in writing this book was the wish to bridge the gap between laryngology and nonmedical phoniatry. Progress in the field of vocal rehabilitation has been slowed down by this gap for quite some time.

Dr. Bloomer's intriguing observation about the geographic distribution of the papers quoted in my book furnishes a key to some aspects of the present situation. His remarks sent me back to the bibliography of my book with interesting results. Of the 150 quotations 63 were taken from publications by American authors while 58 mention research that was done in Europe. Between these two blocks stands a third one with 29 quotations from physicians and speech therapists who got their training in Central Europe and have been working for over twenty years in the United States. Of the 63 quotations from American-trained authors 38 are the work of physicians while 25 represent the research of nonmedical phoniatrists.

Of course, the medical and European background of the present writer may have weighted the balance of quotations somewhat in favor of papers found in the laryngological and European literature. But, by and large, the distribution of the quotations found in the bibliography of the book mirrors a situation that calls for reflection and for a change in some of our methods of training both speech therapists and laryngologists.

The stupendous growth of American speech departments as independent academic institutions has been paid for by an estrangement between medicine and speech pathology that has resulted in a comparative neglect of the important field of physiology and pathology of the voice. In both camps lip service is paid to the need for teamwork but very little of it exists, at least as far as teaching is concerned. At our universities, only a small number of leading speech therapists—of whom Dr. Bloomer is one—are active in research on problems of the human voice and encourage postgraduate students to do research on phoniatric problems. At the same time, residents in laryngology rarely have the opportunity to study patients with vocal problems. Few laryngologists have paid special attention to the acoustics, mechanics and the pathology of the human voice. In contrast to this situation, in Europe close cooperation exists between acoustic physicists, nonmedical therapists and laryngologists. Teams of laryngeal surgeons, laboratory researchers and practical therapists produce a constant stream of phoniatric literature.

Dr. Bloomer is right in saying that the duality of training in laryngology and speech pathology is a fact that, for a number of reasons, cannot be changed. But the time is ripe for establishing closer contact between both camps. In the last few years, more and more leading hospitals have established voice and speech clinics as part of their otolaryngological services. Too few of them are utilized for the training of students of speech departments. Both laryngologists and speech therapists would benefit from a closer cooperation, particularly the exchange of academic teachers between speech departments and medical schools.

In writing this book on vocal rehabilitation I have been guided by the idea of bringing laryngologists and speech therapists together into the kind of teamwork that has created the wealth of European phoniatric literature. It is highly gratifying to see the book accepted by a leading speech therapist as such a bridge between the two professional groups.

FRIEDRICH S. BRODNITZ

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FAIRBANKS, G., *Voice and Articulation Drillbook* (second edition). New York: Harper and Brothers, 1960. Pp. 196. $3.50.

In a full-page announcement in the December 1959 issue of the *Quarterly Journal of Speech*, Harper and Brothers heralded the scheduled appearance in February 1960 of 'the long-awaited revision of a famous text: *Voice and Articulation Drillbook*.' The book has appeared; perhaps the finest tribute to its worth is the failure of the publisher to advertise in the February 1960 *Quarterly!*

Before examining the revised edition in detail it might be profitable to reminisce briefly. The 1940 *Drillbook*, despite its ordinary appearance and meager size, represents an important landmark in the speech and hearing literature. A highly-successful text, it has contributed heavily to the erudition of today's speech and hearing therapists by providing them with materials, by serving as an academic text and by influencing strongly the structure of academic and clinical course offerings. Furthermore, its appeal has not been restricted to one academic level, since questioning the simple-to-apply suggestions of the text lead the student directly to a foundation of theoretical and experimental materials. *En passant*, one might point to the 1940 *Drillbook* as the example par excellence of a text that demonstrates the relations between speech science and clinical activities; the materials are marshalled for use, but are embedded in an experimental and theoretical framework.

The 1960 revision of the *Voice and Articulation Drillbook* provides ample evidence that during the past 20 years Professor Fairbanks has continued to concern himself with problems of research interest and of clinical application, and that his powers of organization and expression have waxed. The author and his publisher are to be congratulated for preserving both the size (the number of pages is actually reduced!) and general format of the book, and for keeping the price at a reasonable level, while improving the typography and binding, and adding attractive graphic materials.

Close examination and comparison with the earlier edition demonstrate that a complete revision has been accomplished within the general framework of the 1940 text. It can be seen that the author has examined critically every word in the text, has given considerable thought to the physical arrangement of practice materials, has profited by the accumulated experience of those who utilized the materials of the 1940 edition and is highly aware of the current research literature.

The last point is particularly clear. While the 1940 text cites about 50 sources, 85 references are in evidence in the revision. The older citations were not carried forward automatically, however, since 59 of the references in the 1960 *Drillbook* bear dates more recent than 1940. (Equally clear is the personal impact of Professor Fairbanks on the research literature—about one-quarter of the citations in the 1940 text are relatable to him in some significant way, and a slightly higher percentage is true of the revised edition.)

The author's attention to detail probably is best exemplified by an examination of the sentences for phonetic inventory (pp. viii ff.) where subtle changes have been accomplished throughout. In general, the changes seem to have been aimed at the eradication of awkward phrases, complexity of sentence structure, and dated words or expressions. The 1940 item 21, for example, has been reduced from 28 to 18 words; its second sentence has been simplified in structure, and the allusion to the 'western front' (obviously an expression pertaining to World War I) removed from the first sentence. Similarly, the now-obsolete *Packard* (1940 item 4) has become a *sedan* before banging into the taxicab.

There are some other changes in the new edition that deserve to be noted. An introductory chapter, 'Speech: A Graphic Introduction,' serves to provide on over-view of the process of speech production, collecting a great many facts that were scattered through the earlier edition. Appreciably less space is devoted to phonetic transcription, consonants, pronunciation, time and pitch; on the other hand, vowels, phrasing, and stress have been granted additional space. Much of the total saving in pages (amounting to 38 pages) is attributable to better utilization of space on each page, elimination of fill-in materials, horizontal rather than vertical listing of words, use of nomograms and graphic aids to reduce verbal descriptions, collection of references into one section, etc.

If there are any clinicians who have been tied inflexibly to the procedures of the 1940 *Drillbook*, they will discover that Professor Fairbanks is no more static in his utilization of the fruits of speech science than he is in the cultivation and collection of those fruits. The speech sound drills of the revised edition, for example, no longer include the writing-sounding technique or nonsense syllables. Instead, the user is asked to locate the individual sound in question by contrasts along some phonetic dimension, and then to use the sound in language materials. Significant changes also have been made in the forms for evaluation of connected speech and phonetic inventory. Omitted from the text are the detailed phonetic classifications of the various sounds, the discussions of typical features, the lists of orthographic realizations of sounds, statistics of frequency of occurrence, use and misuse; some of these materials may be missed.

Of necessity any attempt to reduce the complex materials of speech and language into a form suitable for undergraduate speech improvement and/or correction programs, for use as collateral material in phonetics and voice science courses, and for the clinician's use as source material must involve certain compromises. There is no question that Professor Fairbanks' solution to this problem has merit; the pre-eminence of the 1940 edition of the *Voice and Articulation Drillbook* affirms that fact. It may be fruitful, nevertheless, to indicate the nature of some of the limitations of the text that have been imposed knowingly by the author, ostensibly in the interest of simplicity, and perhaps, of evoking simple or intuitive analogies in the reader. On page xii, for example, in a section addressed to the instructor, it is stated that, 'The 42 items [in Form 2, the phonetic inventory] cover the phonemic system of the General American dialect, with the exception of [ɔ], and are applicable to other dialects with minor changes. Each phoneme is sampled by a pair of sentences that call for usage in representative positions and environments. The pairs are numbered to correspond with the symbols listed in Form 2.' Similarly, on page 12, it is stated, 'Two lists are given for each phoneme.' On page 11, however it is revealed that the concept of the phoneme used in the text is related to broad transcription and is not isomorphic with that usually discussed in the linguistic literature. It can be argued, of course, that Professor Fairbanks' 'utterance-centered purpose' is best served by his analysis. The reviewer tends to agree that it is, but would prefer that the term 'phoneme' not be used in such a context. It is interesting to note in this regard that some linguists advance the idea that the phonemic level of description is not useful for a complete description of the grammar of a language, and that a morphophonemic level of description is preferable.

Another major simplification in the text is represented by the decision to deal with American English in terms of the concept 'General American.' This decision, like the one above, has suffered somewhat at the hands of time. Contemporary work on the linguistic atlas of the United States indicates that the dialect in question is less general and more difficult to specify than believed previously.

Still another simplification is represented by one sentence on page 5: 'To each format there corresponds a resonator that is adjustable.' Although the intention here probably is to provide the student with an intuitively-satisfying conceptual model, one that suggests simple uncoupled resonators may prove to be too misleading to be useful.

The revised edition of Fairbanks' *Voice and Articulation Drillbook* 'reconfirms' and revitalizes the materials that made its predecessor a textbook of significance. Harper and Brothers' failure to advertise is merely an index of their insight as to its worth; the best advertisement this book can get is its author's name.

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Editor's note: This review was sent to the author but no comment was submitted.

GARRISON, KARL C. and FORCE, DEWEY G. *The Psychology of Exceptional Children*, (third edition). New York: The Ronald Press Co., 1959. Pp. 586. $6.00.

Although the title of this book is indicated as 'The Phychology of Exceptional Children,' the preface states that it is an effort to bring together pertinent knowledge of exceptional children which bears upon their education. It is particularly designed for students in teacher education institutions and emphasizes contributions which the regular classroom teacher can make.

The book is child centered as indicated by Part I in which processes for studying and evaluating the individual child are described briefly. This section is an excellent summary which could be utilized by speech and hearing personnel. There are subsequent sections on mental deviates, physical disability, neurological impairments and health problems, and emotional and social maladjustments. The appendix contains a glossary and a selected directory of 16 mm motion pictures. Problems of speech and hearing are classified in the traditional (although inappropriate) pattern under physical disabilities. An effort has been made throughout the book to compile pertinent information from a wide variety of sources. It is footnoted liberally and selected references are presented at the ends of most chapters. Every effort has been made to relate research studies to the educational needs of and adaptations for exceptional children.

Since the readers of this review would be primarily interested in the hearing and speech aspects these chapters will be discussed in greater detail below. They will be considered from the standpoint of the use of such a book in an introductory course in the education of exceptional children. The chapter on hearing presents a brief but adequate description of the types of hearing problems and the methods of detecting hearing loss. There is a summary of information on such characteristics as socio-economic status, speech development, mental ability, motor proficiency and personality adjustments of children who have defective hearing. In discussing eduational adjustments a distinction is made between those necessary for the hard of hearing and for deaf children. The chapter on speech defects deals with definition and classification; a description of articulatory disorders, stuttering, special voice defects, delayed speech; and physical impairments causing speech problems. A great many pertinent studies, articles and books are utilized as sources for considerable information. No attempt is made to discuss therapy in any detail. Some brief suggestions for teachers are provided.

In general the material presented in the chapters on speech and hearing are pertinent and adequate. There are minor inaccuracies which can probably be taken care of by the instructor. For instance, the definition of lisping includes all types of articulatory errors. In discussing the general nature of stuttering, stuttering is defined entirely in terms of the speech symptoms, even though considerable attention is given to emotional factors. A very brief section on voice defects equates the uvula with the solf palate and is confusing in its discussion of the causes and correction of nasality. There are errors and confusions in the selected references. For instance, the American Society for the Hard of Hearing apparently is the American Hearing Society. One wonders about some references selected such as the use of a *Readers' Digest article* for 1937 to illustrate group work with stutterers when such work has been much more recently and adequately described in professional periodicals.

The selection of ideas and facts for presentation in an introductory book of this type is difficult. In general, the authors have done well. However, if this book is designed for teachers and prospective teachers, one omission should be noted. There is no discussion of the appropriate adaptations in the educational process for the speech handicapped, nor is it clear what the speech clinician in the schools contributes to the total educational program. It is true that the speech clinician functions in a manner somewhat different from the regular or special class teacher and provides a therapeutic and remedial service rather than a portion of the instructional and academic program. It is important, however, to help more teachers to understand the function and responsibilities of the speech clinician in the school setting and to learn how they can work with the clinician more effectively. It is unfortunate that this text did not take advantage of the opportunity to add to this needed understanding.

The book reads easily and presents facts, figures and concrete ideas in a well-organized and simple fashion. The criticisms indicated above are essentially minor in nature. This textbook is a useful and usable addition to the literature on exceptional children.

STANLEY AINSWORTH
University of Georgia

Editor's notes: This review was sent to the author but no comment was submitted.

LURIA, A. R., and YUDOVICH, F. IA., *Speech and the Development of Mental Processes in the Child.* (Translated by J. Simon). London: Staples Press, 1959. Pp. 126 $2.10.

In this little book, Professor Luria, the Russian psychologist who made such an outstanding contribution in his *The Nature of Human Conflicts*, published in 1932, provides a fascinating glimpse of Soviet research in the development of speech. A set of identical twins with retarded speech was studied intensively and the characteristics of their comprehension, utterance and behavior were recorded carefully. Then the twins were separated, placed in parallel kindergartens, and one of them was given intensive speech training. The developing changes in language and behavior were studied, Luria's main conclusions were that while speech training speeded and facilitated the acquisition of speech and the ability to think, the essential condition necessary to bring such children from a primitive and impoverished type of symbolic functioning to a state of relative normality was the creation of an environment in which communication with verbal symbols was required. Luria concluded that the acquisition of an adequate language system was the key factor in the improvement of 'the structure of the twins' mental life.' The twin who had been given the speech training surpassed the other twin not only in speech but also in the ability to think.

Although the book has a wealth of keen observations and hypotheses concerning the various problems presented by the child with delayed speech, it is also rich in its references to Russian research in this important field. It is tragic that we know so little concerning their investigations. The reading of this book whets the appetite.

CHARLES VAN RIPER
Western Michigan University

Editor's note: This review was sent to the author but no comment was submitted.

EISENSON, JON (ed.), *Stuttering, A Symposium.* New York: Harper & Brothers, 1958. Pp. 402. $6.00.

This is an excellent book. In this reviewer's opinion, *Stuttering, A Symposium* is the most noteworthy single contribution to date dealing with this problem. The editor is to be commended in his choice of contributors; each writer, including the editor himself, has a distinguished record of research and publication on the subject of stuttering.

Eisenson, in his foreword, comments as follows: 'Each contributor was assured that he could be as expansive, or as concise, as he thought necessary for the presentation of his point of view. Furthermore, he was not to be confined by an editorially imposed format, or by any consideration of style. The only limitation imposed at the outset was that three questions were to be answered, directly or indirectly, in the individual essays: (1) What is stuttering? (2) What is the cause or what are the causes of stuttering? (3) In the light of your concept of stuttering, what are your suggestions for the treatment of stutterers?' Each of the six essays presented brings a valuable and significant contribution to a highly complex problem. Also, they represent a much desired departure from the traditional academic style. Each could very well be expanded into a book. The fact that the authors were able to answer the postulated questions within the limitations imposed by the essay form and still present their points of view in an organized, concise, lucid and interesting manner is something of a triumph.

Because of the concentration of observations, perceptions and information given by each of the contributors it is impossible to select from the various presentations even the most pertinent of statements for quotation or restatement without doing injustice to these presentations. The titles of the essays, however, give some suggestion of the approaches to the problems: 'Stuttering as an Anticipatory Struggle Reaction,' Bloodstein; 'The Psychoanalysis of Stuttering,' Glauber; 'Conflict Theory of Stuttering,' Sheehan; 'An Agnostic's Speculations about Stuttering,' West; 'A Perseverative Theory of Stuttering,' Eisenson; and 'Experiments in Stuttering Therapy,' Van Riper.

Bloodstein, in an exceptionally well organized and interesting chapter, does an excellent job of critical evaluation of various points of view, as well as presenting a great deal of well supported evidence for his own etiological hypothesis. Sheehan has taken the now-familiar concept of approach-avoidance conflicts developed by A. E. Miller in his 'Experimental Studies of Conflict' and developed its direct and related applications to the phenomena of stuttering. It is a scientific, well documented, admirable presentation.

Perhaps the most original and boldest of the essays presented, both in style and content, is, as the title suggests, 'An Agnostic's Speculations about Stuttering' by West, who suggests, among other possible constitutional predispositions, a relationship between certain physical disorders and stuttering.

Of the various contributors to this Symposium, Johnson and Van Riper have long been known among professional workers in speech rehabilitation and psychology as two of the most zealous laborers in the vineyard. Van Riper's long years of dedicated experimentation and research with stuttering therapy are reported in detail in his chapter, 'Experiments in Stuttering Therapy.' His detailed review, dating back to the 1930's, of the day-by-day, month-by-month, year-by-year process of hypothesis, experimentation, trial-and-error, vision and revision, supplementation and discard, predictions and conclusions—reads like a saga or an epic of study, insight and imagination, of objective and relentlessly honest evaluation and re-evaluation, of painstaking study and experimentation. This reviewer, a long-time admirer of Johnson's writings and extensive contributions to the fields of speech and semantics, did not find his introduction to the Symposium particularly germane or helpful in preparing the reader for the clarity, objectivity and perceptions-in-depth which characterize the essays.

Glauber's chapter of 'The Psychoanalysis of Stuttering' is in itself an excellent miniature handbook on psychoanalysis, although many readers, professional therapists and clinicians who lack psychoanalytical orientation—and even those who do not—may have difficulty in accepting some of the premises and conclusions as they are related to stuttering. The reviewer suggests that this chapter, and perhaps Johnson's introduction, will have more significance to most readers if read, not in order of their appearance, but against the etiological and therapeutic background and points of view presented by the other writers.

In view of the patent fact that stuttering is only one of the many forms of behavior of which the person who stutters is capable, and the increasing recognition, either directly stated or implied, of the psychological and therapeutic importance of changing the semantic reactions of the individual who stutters—it seems somewhat ironic that the person who stutters should consistently be referred to by the contributors as 'the stutterer.' Perhaps the need for verbal economy and simplicity make necessary the use of this questionable referent. Due recognition, however, should be given to the probable psychological and semantic fallacies or inadequacies of such a labeling if changing semantic reactions in the person who stutters is important.

For the past ten years this reviewer has been conducting group therapy sessions for adults who stutter. This year, for the first time, a text, *Stuttering, A Symposium*, was required of the class and the clinicians, and outside readings from this publication were assigned. It is felt that as a result of these readings the understandings and insights gained by the class, as revealed by the group discussions, were more effective than those of any previous year. This reviewer has found, however, that with few exceptions the information is not readily assimilated by high school, college or adult stutterers without intensive group leadership and discussion.

Stuttering, A Symposium is a noteworthy achievement. It will be of interest not only to speech pathologists and speech clinicians working with adult stutterers but to school speech therapists as well since each essay deals not only with therapy for adults but with the treatment of the child and young person who stutters. It is a book which should be mandatory reading for all serious students of speech disorders.

LEON LASSERS
San Francisco State College

Author's Comment: This response to Dr. Lasser's review of *Stuttering: A Symposium* represents a joint effort of the contributors. In the interests of space and time, the contributors agreed to permit the editor of the *Symposium* to reflect their views in a single acknowledgment.

It is, of course, difficult to quarrel with Dr. Lasser's evaluation of the book. To live up to this evaluation is a responsibility for each contributor. The editor is grateful that the reviewer believes that the spirit, objectives, and organization of the *Symposium* did not suffer because of the latitude permitted each contributor. It might be noted in passing that the editor recognized that it would be presumptuous even if possible to ride herd on six authorities and to keep them in check. Fortunately there was no choice but to give each author his destination, his head, and a decent amount of time for the essay.

Dr. Lasser's observation that ' . . . it seems somewhat ironic that the person who stutters

should consistently be referred to by the contributors as the *stutterer*' is in order. The contributors certainly do not look upon all persons who stutter as being so much the same, even in regard to their deviant speech, as to justify being given the common label of *stutterer*. Despite this verbal fallacy, the awareness that we should think of persons who stutter, or speak in the manner of those who stutter as individuals rather than as types constitutes part of the underlying theme of several of the contributions. Dr. Glauber observes on this point.

> Those who stutter are properly called stutterers, just as those who tic—ticquers, and those who have neurotic symptoms—neurotics. That does not by any means make all who are so called alike and we ought to make that qualification regularly. However, the point about a verbal fallacy derives from the philosophy of semantics, a philosophy which in the opinion of many is not an adequate basis for psychopathology or therapy; its contribution in stuttering is essentially one of denial. Now it may be possible to help some stutterers by leading them to accept blanket denials of certain fears, even when they do not know precisely what it is they fear. Thus semantics does not contribute insight; it is only a tautology.

The *Symposium* editor felt that Wendell Johnson's response to the reviewer's comment about his introduction deserved specific consideration. Dr. Johnson wrote:

> To an old semanticist it is not astonishing when one's message does not get through, even to an unusually perceptive reader, and so the reviewer's statement that my introduction was not 'particularly germane or helpful in preparing the reader for the clarity, objectivity and perceptions-in-depth which characterize the essays' is not particularly surprising. Especially is it not surprising in view of the fact that, in discussing the basic question of why experts disagree, I was trying to be helpful in preparing the reader not for 'clarity' or objectivity' so much as for the ambiguities and differences in language and in attitudes toward language that made for such disagreement as was present among the six experts, in spite of their clarity and objectivity.

All of the contributors, I am certain, would agree with the reviewer's observation that in general the information presented in *Stuttering: A Symposium* was not intended for use by the high school age or college age person who stutters (or sometimes speaks like a person who stutters), without enlightened leadership and discussion.

The contributors and the editor of the *Symposium* would be content if the final sentence of Dr. Lasser's review were observed. They hope that they are worthy of the opening sentence.

Queen's College JON EISENSON